BULLETIN
of the
Chicago Herpetological Society

Volume 56, Number 10
October 2021

BULLETIN OF THE CHICAGO HERPETOLOGICAL SOCIETY
Volume 56, Number 10
October 2021

Portrait of a Herpetologist as an Older Man—Chapter 3: Zoo Years . . . . . James B. Murphy 173

Notes on Mexican Herpetofauna 38: Predation by a Central American Indigo Snake (*Drymarchon melanurus*) on a Western Ribbonsnake (*Thamnophis proximus*) in the municipality of Juárez, Nuevo León, México . . . . . Edgar E. Hernández-Juárez, Miriam E. Solís-Barajas, Mario A. Rivera-Arias, Juan Antonio Salas-García, David Lazcano, Daniel Cruz-Sáenz and Larry David Wilson 179

Book Review: *A Photographic Guide to the Snakes of Java* by Nathan Rusli . . . . . Eric W. Stitt 185

Desert Iguanas from Sand Dunes to Saguaros: Comparing Observations between California and Arizona—Part 1 . . . Roger A. Repp 187

Minutes of the CHS Board Meeting, September 17, 2021 194

Herpetology 2021 195

New CHS Members This Month 196

Advertisements 196

Cover: A pair of mating desert iguanas, *Dipsosaurus dorsalis,* near Desert Center, Riverside County, California. Photograph by Jeff Howland.

STAFF

Editor: Michael A. Dloogatch—madadder0@aol.com
Copy editor: Joan Moore

2021 CHS Board of Directors

President: John Archer
Vice-president: Rachel Bladow
Treasurer: Rich Crowley
Recording Secretary: Gail Oomens
Media Secretary: Stephanie Dochterman
Membership Secretary: Mike Dloogatch
Sergeant-at-arms: Tom Mikosz
Members-at-large: Kyle Houlihan
Margaret Ann Paauw
Amelia Pollock
Immediate Past President: John Gutierrez

The Chicago Herpetological Society is a nonprofit organization incorporated under the laws of the state of Illinois. Its purposes are education, conservation and the advancement of herpetology. Meetings are announced in this publication, and are normally held at 7:30 P.M., the last Wednesday of each month.

Membership in the CHS includes a subscription to the monthly *Bulletin*. Annual dues are: Individual Membership, $25.00; Family Membership, $28.00; Sustaining Membership, $50.00; Contributing Membership, $100.00; Institutional Membership, $38.00. Remittance must be made in U.S. funds. Subscribers outside the U.S. must add $12.00 for postage. Send membership dues or address changes to: Chicago Herpetological Society, Membership Secretary, 2430 N. Cannon Drive, Chicago, IL 60614.

Manuscripts published in the *Bulletin of the Chicago Herpetological Society* are not peer reviewed. Manuscripts and letters concerning editorial business should be e-mailed to the editor, mdloogatch@chicagoherp.org. Alternatively, they may be mailed to: Chicago Herpetological Society, Publications Secretary, 2430 N. Cannon Drive, Chicago, IL 60614. **Back issues** are limited but are available from the Publications Secretary for $2.50 per issue postpaid.

Visit the CHS home page at <http://www.chicagoherp.org>.

The *Bulletin of the Chicago Herpetological Society* (ISSN 0009-3564) is published monthly by the Chicago Herpetological Society, 2430 N. Cannon Drive, Chicago IL 60614. Periodicals postage paid at Chicago IL. **Postmaster:** Send address changes to: Chicago Herpetological Society, Membership Secretary, 2430 N. Cannon Drive, Chicago IL 60614.

Copyright © 2021

Bulletin of the Chicago Herpetological Society 56(10):173-178, 2021

Portrait of a Herpetologist as an Older Man—Chapter 3: Zoo Years

James B. Murphy
3100 Connecticut Ave NW, #431
Washington, DC 20008

Some of the vignettes in this article have been published elsewhere, but are included again here to produce continuity.

In 1966 I was delighted to learn that Dallas Zoo would cover expenses for a collecting trip to the Bahamas to secure specimens for our collection. My plan was to meet curators from Waco and Houston Zoos on New Providence Island to bring additional funds for an extended trip to other sites. Unfortunately, they were delayed and I soon was penniless. For a week, I slept in an auto junkyard. Legions of bloodthirsty mosquitoes nearly exsanguinated me.

Luckily, I met a young street urchin who taught me how to steal conchs and shellfish on the piers without being caught. When my friends finally arrived, we traveled on a mail boat to Bimini, Exuma, and Andros Islands and found a number of ground iguanas, boas, geckos, anoles and amphibians for the three zoos. The other two went on to Haiti and Grand Cayman Island and we met back in Florida to split the spoils.

One saddening sight was seeing a Haitian boat—small and barely seaworthy—off the Exuma coast, packed with fleeing Haitian families being arrested by gendarmes from New Providence Island. Our mail boat attached a line to the smaller one, and turned around toward Haiti. The desperate outcry of these families when learning of their fate was heartbreaking. I asked the New Providence officials why these poor souls could not be taken into custody to their country They explained that this would cause an international incident.

Traveling back to Florida on an airplane with the mass of animals for all three zoos was quite an experience. Flight attendants noticed the cloth bags jumping around, so I had to spill the beans; they insisted that I show all of the passengers our animals so I stood in the aisle doing show and tell for the entire return trip. The iguanas stole the show and the snakes were a close second! Kids loved the frogs.

When we met back in Florida, my friends' stories about the state of affairs in Haiti were horrendous. One example will suffice: locals were enlisted to bring specimens to trade for new apparel brought from U.S. Most were wearing ragged shorts and T-shirts. Those able to make a trade tore off their clothes and threw the items in the wet mud. Others then jumped into the mud to retrieve those garments, and tore off the ones they had been wearing. This scenario continued until only scraps of cloth remained.

My treasured friendship with William W. Lamar

Bill Lamar and I first met at the Dallas Zoo when he was in Dallas in 1974 to attend a wedding. He graced us with his ethereal presence and we had an excellent, lengthy visit. That was when Bill first met the herp crew as well. Bill moved to Colombia in 1976 to work as research assistant to Federico Medem at the Instituto Roberto Franco, a branch of the National University in Villavicencio, a 4-hour drive from the capital of Bogotá. Upon completion of that work, his long-suffering wife Nancy and he remained in Colombia to finish a research project he planned to use for his graduate school thesis back in the states. They took jobs working for Gonzalo Chacón, owner of the Zoológico Santa Cruz, a zoo situated in a mountainside cloud forest south of the capital.

From the outset they struggled, as Gonzalo had undisciplined notions of how to run a zoo. These conflicted with Bill's desire to modernize and gain recognition. The collection included numerous rare creatures seldom exhibited. Gonzalo and Bill had gone from pleasant to strained relations over a host of issues; Gonzalo was at fault for numerous transgressions and Lamar was at fault for lack of diplomacy. Once things nearly came to an end but they had managed to patch things up. Bill's wife Nancy ran the restaurant and gift shop and she did her usual marvelous job, endearing herself to all who worked for her. And she was always gracious to Gonzalo.

But then one day Gonzalo, upset over some imagined thing, unloaded on her in a public venue and reduced her to tears. This was the breaking point; either they made their departure or else Bill was going to wind up assaulting the owner. Moreover, their passports were expiring so they decided to take their leave, obtain new passports at the embassy, and embark on a lengthy trip visiting other South American countries. After that interlude, Bill returned to Villavicencio to finish up his fieldwork. They were in the process of packing up when Jack Joy and I came down for a visit. We were able to lend a hand packing and were able to spend time at the zoo and help with packing and moving. We also did some herping in the eucalyptus forest below the zoo, finding a weird blindsnake and some pygmy geckos (*Pseudogonatodes*) as well as striped racers (*Dendrophidion bivittatus*) and a coralsnake (*Micrurus mipartitus*). We then adjourned to Villavicencio where we met Fred Medem (Figures 1 and 2), viewed the institute, and went on some fun herping excursions. On one of these we ascended the forested

Figure 1. Jack Joy, Fred Medem and Jim Murphy examining a sloth. Photograph by Bill Lamar.

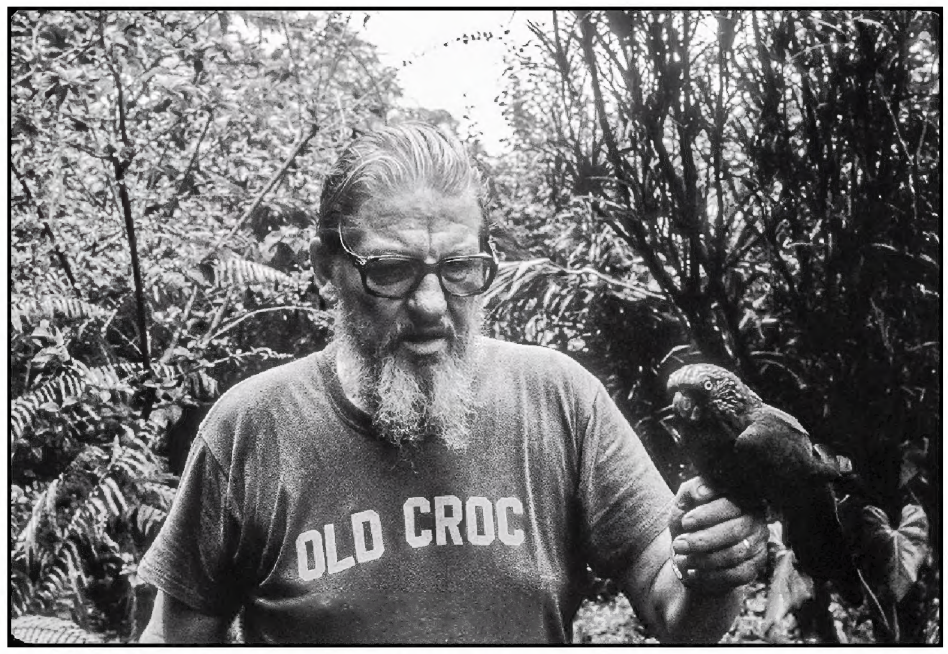


Figure 2. Fred Medem with a Hawk-Headed Parrot (*Deroptyus accipitrinus*). Photograph by Bill Lamar.

slope of the Andes Mountains above the Bavaria Brewery. They protected their watershed, so the habitat was excellent despite its proximity to town.

While spotlighting for herps one night we collected a Smooth-fronted Caiman (*Paleosuchus trigonatus*), which pleased Fred no end. We also went up into the mountains and hiked down into the Río Negro valley where we spent an afternoon at Finca Las Orquídeas herping before slowly making our way back up to the road where we snagged a bus back to Villavicencio. During all our herping trips, I distinguished myself by lounging around at every opportunity while the peripatetic Jack Joy (Figure 3), possessed of boundless energy, was in constant motion.

Memorably, when we took our leave from Medem and Villavicencio, we took an express cab—one that needed five passengers in order to leave. Bill and Jack were the first to arrive and being tall, I sat up front. We waited and waited and an odd-looking Colombian with thick glasses and a briefcase periodically came out and stared at us. Finally the cabbie rudely informed us that the guy was going along but did not like gringos so he made me sit in the back—in the middle—for a very uncomfortable and lengthy ride. Lamar simmered at the racism and when the sun set took out his knife and surreptitiously sawed a football-sized hole in the seat. When we reached the outskirts of Bogotá, Bill had him let us out and we escaped into an urban cab to reach our destination.

Figure 3. Jack Joy holding a large *Crocodylus intermedius* skull. Photograph by Bill Lamar.

When we visited Juan Manuel Renjifo at his office at the Instituto Nacional de Salud in Bogotá (Figure 4), where Colombia's antivenom is produced, we were talking about a *Micrurus mipartitus* Bill had collected at the Santa Cruz Zoo (Figure 5). Suddenly there was the sound of breaking glass in a lab next to Juan's office. We went in and found that one of the technicians had just dropped a container holding several years' worth of serum. Juan seemed unfazed, explaining that it would be used to counteract cattle snakebites.

Figure 4. Juan Manuel Renjifo, Director, Instituto Nacional de Salud in Bogotá. Photograph by Bill Lamar.

Figure 5. Red-banded Coralsnake, *Micrurus mipartitus*. Photograph by Bill Lamar.

Figure 6. *Cryptobatrachus fuhrmanni* bearing eggs. Photograph by Bill Lamar.

Juan had a young student visitor from Universidad Nacional de Colombia (National University of Colombia). When we asked about her experiences there, she had just graduated with an undergraduate degree after eight years. The campus was surrounded with a high fence with concertina wire and armed guards. Political and student protests had closed the school for half of the time.

Later we went down to the Río Magdalena valley to the town of Armero, Tolima, to visit one of the serpentaria and milking stations used by the institute. The water was rushing so thou-

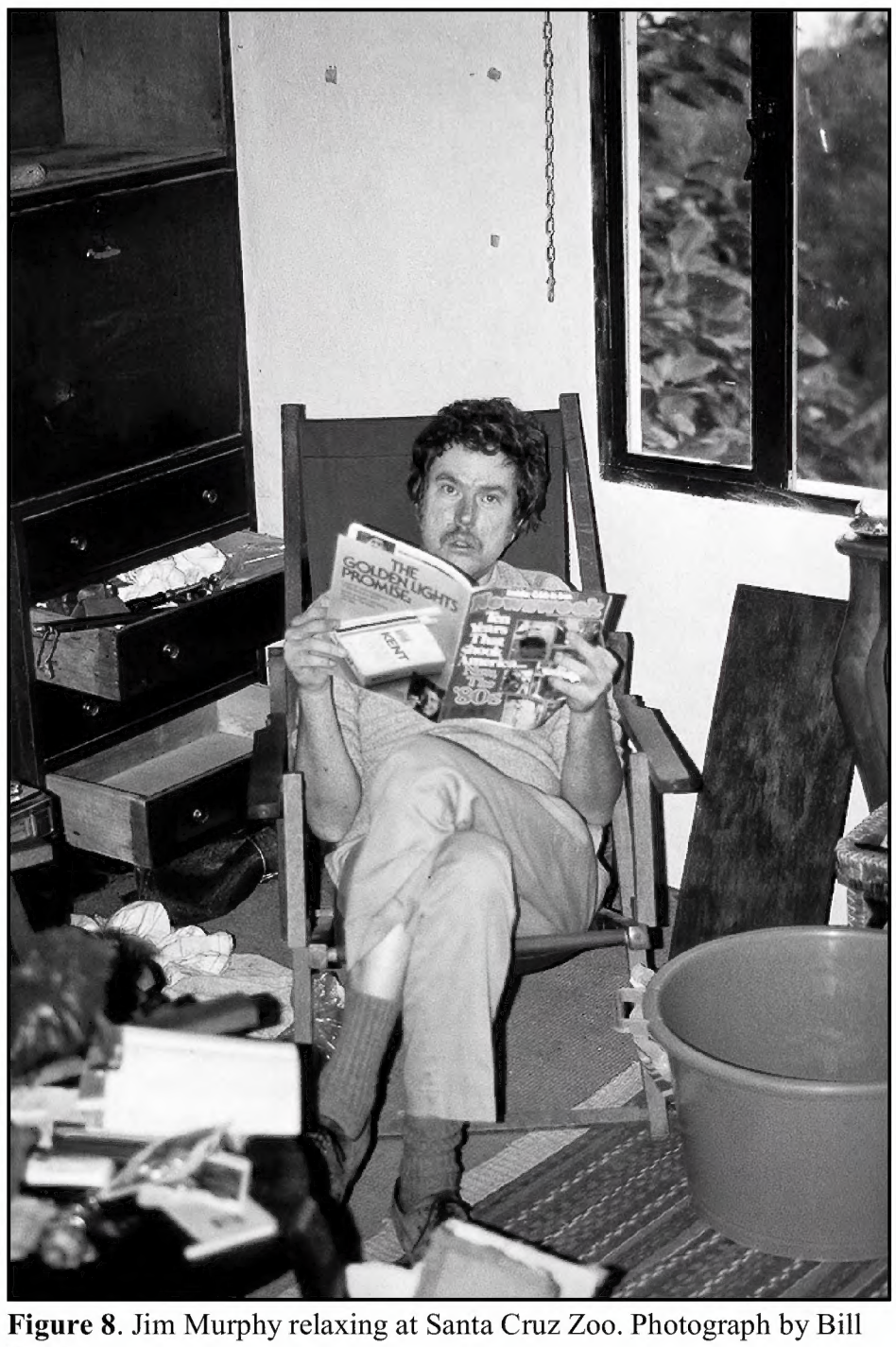


Figure 8. Jim Murphy relaxing at Santa Cruz Zoo. Photograph by Bill Lamar.

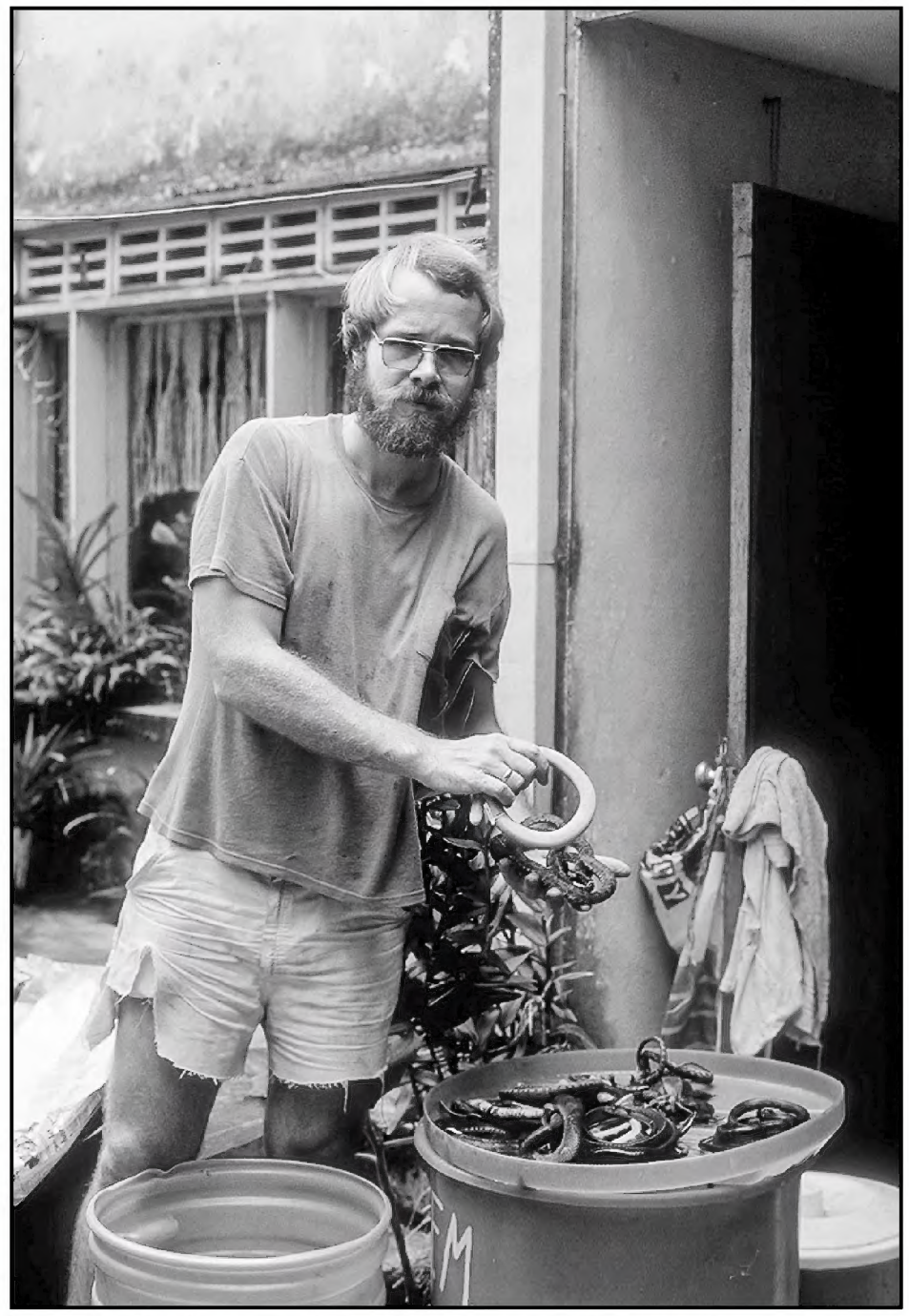


Figure 7. Bill Lamar in Villavicencio unpacking snakes from a field trip.

sands of fish were moving upriver to mate. Fishermen were scooping them up with huge nets, for sale as food in Bogotá. I have been an aquarist for most of my life so the sight of these aquarium gems broke my heart—loricariids, pimelodids, etc. While there, Jack Joy collected the unusual hemiphractid frog *Cryptobatrachus fuhrmanni*; it was a specimen bearing eggs on its back (Figure 6). Bill prepared squamate specimens for the collection (Figure 7) while I oversaw the procedure at my leisure (Figure 8).

The nearby Nevado del Ruíz, at 17,500 feet, famously erupted in 1985. Within four hours of the eruption, lahars traveled over 60 miles, killing more than 23,000 people, injuring over 5,000, and destroying more than 5,000 homes. Hardest hit was the town of Armero, where three quarters of the 28,700 inhabitants died. I was watching the news on TV and an aerial shot showed the area—only the church steeple was visible.

About a year after our visit Gonzalo Chacón met an untimely end. It was payday at the zoo and a couple of thieves from a nearby town robbed Gonzalo of the payroll and shot him nine times. He died on the doorstep of the house we had shared with Bill and Nancy.

My treasured friendship with Jonathan A. Campbell

When I started working at Dallas Zoo in 1965, one of the first herpetologists I met was supervisor Jon Campbell at the

Figure 9. Helmeted Iguana, *Corytophanes percarinatus*. Photograph by Bill Lamar.

Fort Worth Zoo, and we remain friends to this day. Rather than spending time outlining his extraordinary accomplishments in our profession, consult my article *No Ordinary Jon. A Look at the Life of Jonathan A. Campbell* (Fauna Magazine. 1997. 1(1): 72-78).

Jon lived in Guatemala City for his grade school days. He collected herps there at that time, and also did so every summer during graduate school. He kindly convinced me to join him in Guatemala and so we stayed at his family's luxurious home with swimming pool, surrounded by servants catering to our every whim. Never had my shoes been polished to such a sheen, nor the car been so clean, or the meals so delicious. Jon took me to his favorite sites but one surprise was the basket hanging by a thin wire on the porch of his house with a Helmeted Iguana, *Corytophanes percarinatus*, resting in the plants (Figure 9). We were both stunned as there seemed to be no other means of reaching the planter other than dropping from the sky. Unlike the other species in the genus, this taxon is viviparous.

A welcome stroke of fate occurred in 1973 when Campbell met Barry L. Armstrong, a rattlesnake enthusiast from California. Barry had placed a number of living rattlesnakes on loan at the Dallas Zoo, and when Jon mentioned that he was planning some trips to Mexico and Guatemala, I suggested that he extend an invitation to Barry, a skillful field biologist. Their relationship proved to be highly productive and a number of rare taxa were collected.

This meant that Barry and Jon had to periodically travel back to Dallas so that animals were not held for weeks in the field. Based on their field and captive observations, papers dealing with systematics, biogeographical, behavioral, reproductive and other data from the animals collected on these excursions were published later. A number of the rare venomous snakes and coral snake mimics placed at the zoo were photographed for a subsequent book.

During our travels, the wholesale destruction of habitats was overwhelming; Jon was visibly shaken across the road from the Quetzal Preserve [Reserva Natural Ranchitos del Quetzal near Purulhá, Guatemala] when we drove to see his dissertation site of splendid tree fern cloud forest habitat cleared, with a leather

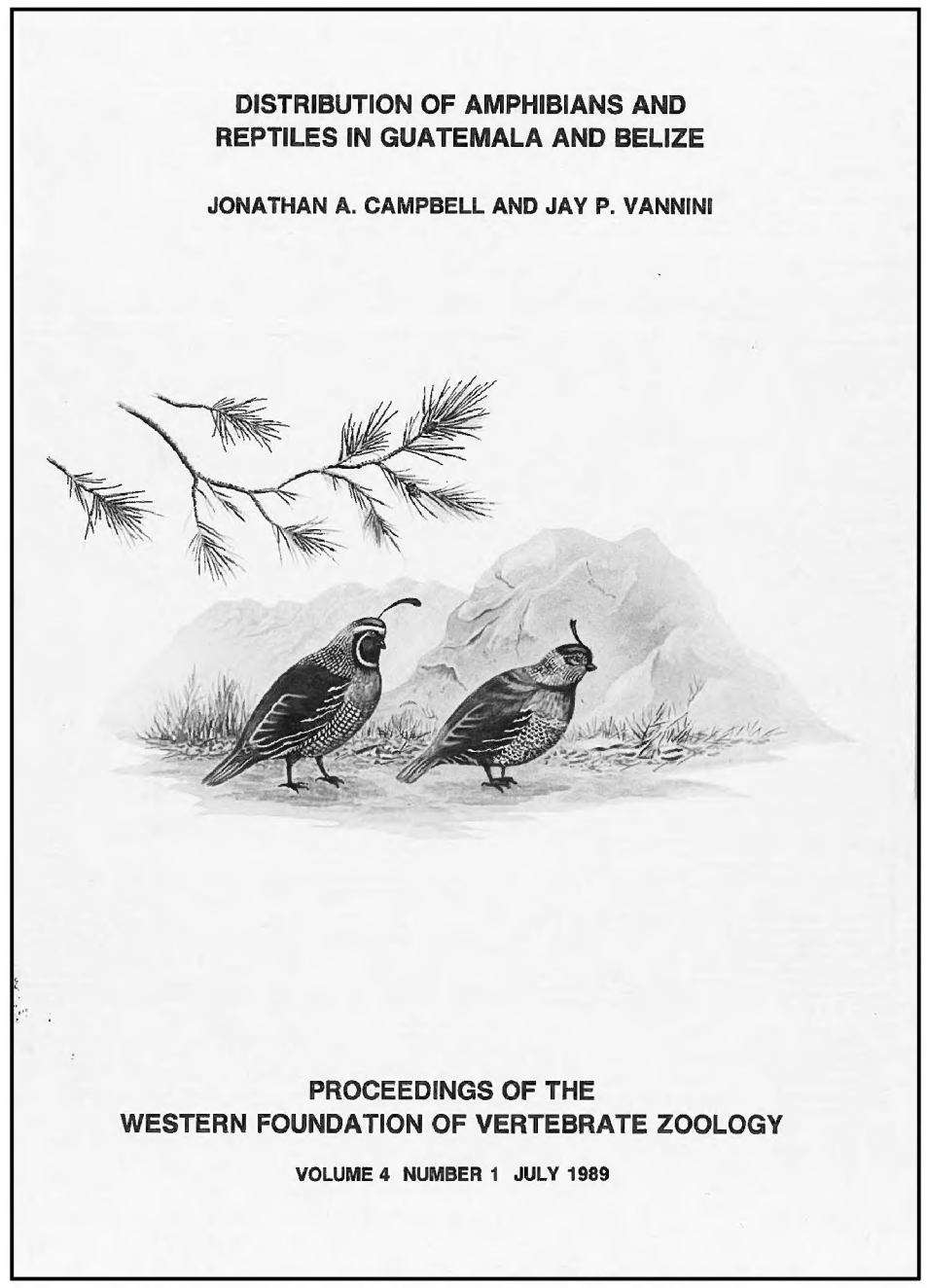

DISTRIBUTION OF AMPHIBIANS AND
REPTILES IN GUATEMALA AND BELIZE
JONATHAN A. CAMPBELL AND JAY P. VANNINI
PROCEEDINGS OF THE
WESTERN FOUNDATION OF VERTEBRATE ZOOLOGY
VOLUME 4 NUMBER 1 JULY 1989

Figure 10. Publication by Jon Campbell and Jay Vannini on Guatemala and Belize.

fern plantation for the commercial market replacing it.

From there to the site of another disaster, the clearing and burning of most of the middle Motagua Valley which had recently been given over to cultivation of cantaloupe and tobacco. This area had been badly degraded by humans, as noted by Jon and his co-author Jay Vannini in their description of the Guatemalan Beaded Lizard, *Heloderma charlesbogerti* (Figure 10).

My first trip in Guatemala without Jon was to Tikal, the ruins of an ancient city found in a rainforest in Guatemala, a large archeological site. It was an urban center of the pre-Columbian Maya civilization. It is located in the region of the Petén Basin in what is now northern Guatemala. Situated in the Department of El Petén, the site is part of Guatemala's Tikal National Park and in 1979 it was declared a UNESCO World Heritage Site.

Jon took me to the airport in Guatemala City and I was escorted to a DC3 airplane where, surrounded by a few plane crashes alongside the runway, I was escorted to my seat by a wizened old male air steward. The floor was unpainted plywood and children's school desks with inkwells were bolted to it—not a pleasant excursion for an adult human of normal size. After a two-hour flight over unbroken lowland rainforest, the air strip was surrounded on both sides by remnants of unsuccessful flights. Once on firm ground, I began to see much wildlife such as numbers of beautiful, tame, Painted Wood Turtles, *Rhinoclemmys areolata*, and ocellated turkeys, equally tame, being hand fed by the tourists.

Another trip, to Lake Petén, included my wife Judith and

Jon's wife Tanya—both ladies tolerating their spouses who preferred watching frogs and Morelet's crocodiles to shopping for jade jewelry (it must be said here, dear reader, that I bought my wife a lovely array of jade jewels in the gift shop). The owners of this cabin complex showed us an enormous croc skull [at least for a Morelet's crocodile] and described several instances of fatalities. A large number of mid-sized ones were basking on the shore. Judith found many anurans, spiders and scorpions in the shower, and spotted a mid-sized boa constrictor when she finished her bathing. Our return trip to the city was eventful when our DC3 hit an air pocket, dropping ca. 5000 ft according to the pilot who was apologetic and shaken as splattering beverages and food rained down upon us from the ceiling and covered our bodies.

The Zoo La Aurora, located in the heart of Guatemala City, is one of the largest gardens in the city with 287 species and more than 2100 animals in the entire collection. The zoo receives more than 1.5 million visitors yearly. All the efforts are focused on public education, innovation, and renovation of the park. The Zoo covers over 15 hectares with animals from around the world such as Humboldt penguins, chimpanzees, big cats, Asian elephants, giraffes, and the new project *El Reino Kan y sus Reptiles* that is the biggest project in the zoo's history with a building and naturalistic outdoor enclosures housing more than 50 species of reptiles, amphibians and spiders. We arranged to work with Lorena Calvo from Guatemala Zoo on this project that included scientific exploration and collection of specimens for both zoos.

Our first trip was disappointing. Some years ago, Jonathan, Edmund D. "Butch" Brodie, Jr., and I traveled at night from Guatemala City to Finca Chiblac, on the northern slope of the Sierra de los Cuchumatánes. The main purpose of our trip was to collect several species of rare salamanders, particularly *Nyctanolis* and *Bradytriton.* The former is a large, active, long-limbed nocturnal salamander that acts more like an anoline lizard than a salamander. Since much of Brodie's research has documented salamander antipredator behavior, we were interested in obtaining living specimens for behavioral observations. After being hassled at various military checkpoints, we finally arrived at the finca, where we noticed a number of human statues carved from tree fern trunks on the roofs of the building and scattered around the farm. This was an area of considerable guerrilla activity and we learned that the statues were placed strategically to confuse the rebels so that the farm would appear to be filled with defenders. We began to collect in the mornings, but we were nervous about the political instability in the area; hence, we decided to return to Guatemala City in the early afternoon to avoid any encounters with the rebels. For example, we kept hearing explosions that sounded like a major thunderstorm on the adjacent mountain range but learned that it was the soldiers bombing the guerillas. I noticed gun barrels glinting in the sunshine on the hillside. As we were driving back, we noticed with horror that the forest had been completely leveled on both sides of the road by the Guatemalan military in order to eliminate hiding places for the guerrillas. Their scheme certainly worked, for there was no cover remaining, neither for the rebels nor for herps.

Another trip, this time to Quetzaltenango, included Butch, Jon, Jay Vannini and me. Jon and Butch flew on a small private plane with inclement weather a concern between two of the major volcanoes, Volcán de Agua and Volcán Acatenango. Jay and I wisely drove. We stayed at Jay's farm, Finca El Faro, in Departamento de Quetzaltenango, and enjoyed a lovely vacation with fine cuisine, plentiful libations and limitless herps. The setting was spectacular with the Santa María volcano in the background. and the associated Santiaguito Volcano, one of the most active lava dome complexes in the world. All of a sudden, pent-up smoke, ash, fire and lava blew out the side of the mountain with a stupendous roar, and white ash covered the whole area like a major snowstorm. Mercifully, there was a valley between us.

Butch was collecting lizards by using a heavy rubber band like a slingshot to stun them. When I asked if he ever missed, he claimed that he was legendary—without a peer in our community. I was skeptical so I challenged him to a duel with a reasonable wager, much like Robin Hood shooting an apple off a human head. Drum roll! A lighted cigarette was at a jaunty angle in my mouth, with visions of easy cash. Butch loaded and shot the cig clean out of my mouth. Double or nothing—vanquished again!

Collecting was successful: *Plectrohyla avia*, *Micrurus latifasciatus*, *Oedipina stenopodia, Ninia sebae, Micrurus nigrocinctus, Sibon nebulata,* and many others.

Barry and Jon were in Dos Aguas, Michoacán, during the 1970s searching for the elusive Tancitaran dusky rattlesnake. Several local cowboys began to taunt the two herpetologists, pointing out that Americans were soft, spoiled, lazy, and incapable of hard work. The greatest insult hurled at them was that they were incapable of using a lasso properly. Unknown to the locals, Campbell had worked on a ranch each summer while he was in high school where he learned to rope cattle with great skill. As the two sides argued, Campbell picked up the lasso. Three burros were galloping down the dusty road toward them at great speed. John twirled the rope around his head and casually flipped it backwards over his body. Miraculously, the rope settled over the first burro's head and tightened on its neck. In one deft motion, Jon wrapped the other end around a fence post that caused the burro to flip into the air and crash to the ground. The cowboys were incredulous at Jon's proficiency and were totally deferential and respectful for the remainder of the trip.

In 1984, Jonathan was diagnosed with a probable malignant thyroid tumor; it appeared as though his days were numbered. He put his affairs in order and prepared for death. A number of his friends came to Arlington to say goodbye and we had a somber final meal at my house before his surgery, scheduled for the near future. It was a relief to all of us to learn that the tumor, although exceedingly large, was benign. In spite of this close call, Jon was not the most responsible patient after surgery, for he often forgot to take his thyroid medication. His friends reminded him constantly to pay attention to his regimen. A few years later, he presented a paper at a major herpetological society meeting. Naturally, he forgot to take his elixir. Jon began his presentation with great energy and enthusiasm, but slowed to a snail's pace toward the end. His predicament reminded me of a

Figure 11. The abode of the Campbell family in summer. Photograph by Jon Campbell.

Figure 12. The abode of the Campbell family in winter. Photograph by Jon Campbell.

child's windup toy winding down.

When Jon retired, Tanya and he decided to stay in Texas. They spent time in Palacios on the Texas coast before deciding to permanently relocate to Llano, Texas. Jon and Tanya were invited to a neighborhood party there where the wealthy host turned out to be interested in herps and stopped the gathering in midstream and announced to all that a distinguished author was in their midst. Jon learned that the host owned a three-story Victorian house that was currently vacant and for sale. Jon asked the cost and the owner paused for a moment and said that he would trade an inscribed set of Campbell's two-volume *Venomous Reptiles of the Western Hemisphere* for the house—incredible! Jon later backed out of the deal as the house required major renovation and would have to be moved a couple of miles—no small undertaking.

Tanya and Jon wanted to live in a natural setting but could not find a suitable dwelling. Eventually, they passed a large, vacant, for-sale church, built in 1904, with a tall steeple, altar, seating for parishioners, podium, original collection plates, bell tower and bell (Figures 11 and 12). When he bought it, I asked if he planned to sell indulgences. The church had to be moved as it was located some 25 miles away. They hired a house-moving company and police as escorts to accompany this imposing bundle but had to also hire the electric and telephone utilities to disconnect overhead wires, as the steeple was too tall to pass. The bell needed to be repaired—when rung, local people stopped by and asked when services would begin. Remodeling the innards was quite a lengthy and expensive chore but the final result is impressive. Jon has completed a turtle pool and dog runs for three white adult German Shepherds (Figure 13) are being planned.

Figure 13. Jon purchased a van so he can take his three white German Shepherd canines conveniently down to the Llano River to swim. Photograph by Jon Campbell.

Acknowledgments

Thanks to Judith Block, Jon Campbell, and Bill Lamar for many happy moments in the field over many years.

To be continued

Bulletin of the Chicago Herpetological Society 56(10):179-185, 2021

Notes on Mexican Herpetofauna 38: Predation by a Central American Indigo Snake (*Drymarchon melanurus*) on a Western Ribbonsnake (*Thamnophis proximus*) in the municipality of Juárez, Nuevo León, México

Edgar E. Hernández-Juárez [1], Miriam E. Solís-Barajas [2], Mario A. Rivera-Arias [3], Juan Antonio Salas-García [3], David Lazcano [2], Daniel Cruz-Sáenz [1] and Larry David Wilson [4]

Abstract

We report predation by the Central American Indigo Snake (*Drymarchon melanurus*) on the Western Ribbonsnake (*Thamnophis proximus*). In addition, we describe certain aspects related to the biology of each species and provide a brief description of the study site.

Resumen

En este documento reportamos la depredación entre dos especies simpátricas, víbora negra (*Drymarchon melanurus*) como depredador y la culebra jarretera occidental (*Thamnophis proximus*) como presa. Además se describen algunos aspectos relacionados a la biología de cada especie y una breve descripción del área sitio.

We document a new food item for the Central American Indigo Snake (*Drymarchon melanurus*) with photographic evidence of the event. We observed the incident on a road next to a water body (Cascadas de Santa Ana) during a field trip to Monumento Natural El Cerro de la Silla (MNCS), Juárez, Nuevo León (25°33'26.82"N, 100°11'9.20"W, WGS84; elevation 578 m).

On 29 November 2019 at 2:30 P.M., we were conducting a faunal survey (mammals) for a student's thesis, but looking for amphibian and reptiles out of curiosity in this study site (Cascadas de San Ana). As we were checking camera traps, we came across a Central American Indigo Snake (*Drymarchon melanurus* ♀) eating a Western Ribbonsnake (*Thamnophis proximus* ♂) (Figures 1–3). While we were photographing the event, the indigo snake regurgitated its prey still alive. The incident lasted for about three minutes. No measurements were taken of either specimen; the event occurred *in situ*.

Figure 1. Central American Indigo Snake swallowing a Western ribbonsnake. Photograph by Edgar E. Hernández-Juárez..

Figure 2. The predator—Central American Indigo Snake (*Drymarchon melanurus*). Photograph by Edgar E. Hernández-Juárez.

A potential distribution map for the two species was made using QGIS v. 3.4.15 based on layers of elevation, climate and vegetation of Mexico and the locality information obtained from GBIF after a data cleaning (Figure 4).

Background on *Drymarchon melanurus* (A.M.C. Duméril, Bibron & A.A. Duméril, 1854)

Drymarchon melanurus is a large species with a robust body. It is the second largest snake found in Mexico and the largest species of the family Colubridae in Mexico (Lee, 2000; Wüster

1. Universidad de Guadalajara, Centro de Estudios en Zoología, Centro Universitario de Ciencias Biológicas y Agropecuarias, Apartado Postal 1-1919, Guadalajara, Jalisco, C.P. 44101 México. EEHJ: edmanuel97@hotmail.com; DCS: dcruzsaenz@gmail.com.

2. Universidad Autónoma de Nuevo León, Facultad de Ciencias Biológicas, Laboratorio de Herpetología, Apartado Postal 157, San Nicolás de los Garza, Nuevo León, C.P. 66450 México. MESB: liz_solis_1997@hotmail.com; DL: imantodes52@hotmail.com.

3. Universidad Autónoma de Nuevo León, Facultad de Ciencias Biológicas, Laboratorio de Laboratorio de Ornitología, Ciudad Universitaria s/n, San Nicolás de los Garza, Nuevo León, C.P. 66450 México. MARA: mario_river25@hotmail.com; JASG: juan_0305@hotmail.com.

4. Centro Zamorano de Biodiversidad, Escuela Agrícola Panamericana Zamorano, Departamento de Francisco Morazán, Honduras; 1350 Pelican Court, Homestead, FL 33035-1031, USA. bufodoc@aol.com.

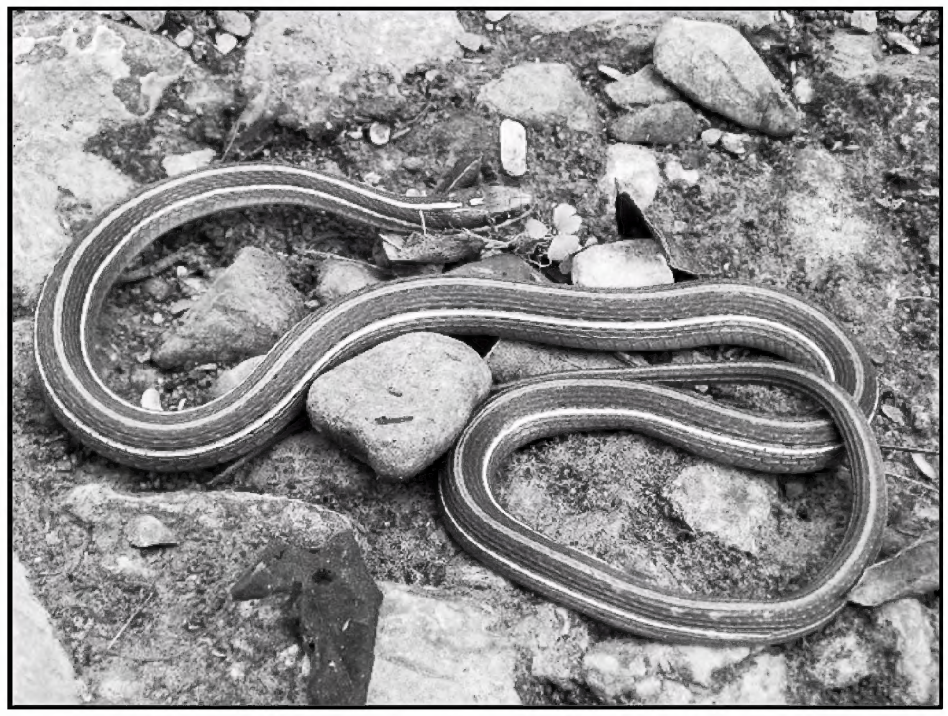


Figure 3. The regurgitated prey—Western Ribbonsnake (*Thamnophis proximus*). Photograph by Edgar E. Hernández-Juárez.

et al., 2001). The body color is almost completely dark, although sometimes they show some reddish or orange spots and have dark lines radiating from below the eye along the margins of the supralabials. The venter can be completely dark or have reddish and white spots; in some individuals it can have a whitish or milky tone. The tail is black with a reddish, orange or totally black underside. The pupil is round, and the scales are smooth and in 17 rows at midbody (Lazcano-Villarreal et al., 2010; Heimes, 2016; Lemos-Espinal et al., 2018).

The diet is varied, consisting of rodents, fishes, frogs, birds, turtles, lizards and snakes, even rattlesnakes, coralsnakes and individuals of its own species (Hardy and McDiarmid, 1969; Lee, 2000; Vázquez-Díaz and Quintero-Díaz, 2005; Lazcano-Villarreal et al., 2010; Lemos-Espinal and Dixon, 2013; Heimes, 2016; Morales-Sánchez and Guevara-Chumacero, 2016; Platt et al., 2016; Lemos-Espinal et al., 2018). We include a table to cite several food items that have been documented for the species.

Drymarchon melanurus ranges from Texas in the Atlantic versant and Sonora in the Pacific versant to Venezuela and Ecuador. This is a terrestrial snake with diurnal habits and a habitat mostly related to streams, rivers, and other water bodies, but it is also possible to find it far from any of these (Vázquez-Díaz and Quintero-Díaz, 2005; Heimes, 2016; Lemos-Espinal et al., 2018). Heimes (2016) described the species as highly tolerant, being found in both xeric and mesic conditions.

Drymarchon melanurus is not endemic to Mexico, and is listed by the IUCN as a species of least concern. It has an EVS score of 6 (low vulnerability species) and is not listed in the Mexican NOM-059 status (SEMARNAT, 2010; Nevárez-de los Reyes et al., 2016).

Background on *Thamnophis proximus* (Say, in James, 1823)

Thamnophis proximus is a snake that has keeled scales, a striped pattern and a round pupil. The background color is olive green or brownish gray, and a light vertebral line runs the length of its body. This middorsal stripe can vary in its color depending on the geographic location and can vary from grayish-tan, gold, orange, or red. In this portion of its range, the stripe is orange, begins at the base of the head and is bordered by a black line on both sides. The lateral line is a yellowish color and below it is a brownish stripe paler than the dorsum. The ventral color is the palest but sometimes it blends with the body color. The head is the same color as the body with a well-defined fused pair of bright parietal spots. The scales on the lips lack dark markings, and are the color of the ventral scales (Rossman et al., 1996; Lazcano-Villarreal et al., 2010; Lemos-Espinal et al., 2015; Lemos-Espinal et al., 2018).

This species is strongly associated with brushy habitats in close conjunction with wet places, such as swamps, marshes, ponds, lakes, and rivers, and it feeds primarily on amphibians (Rossman et al., 1996; Lazcano-Villarreal et al., 2010; Lemos-

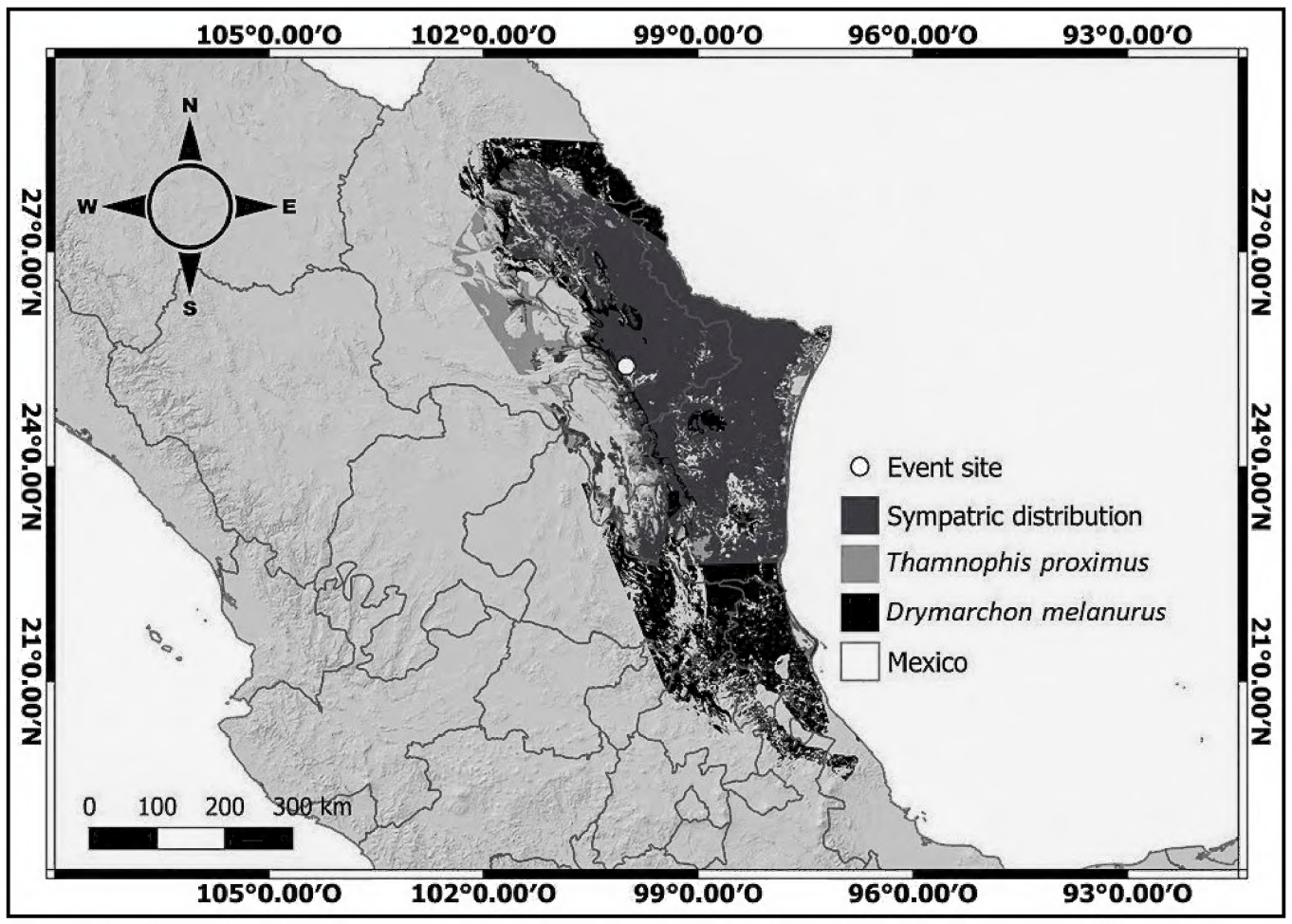


Figure 4. Potential distribution map for the Central American Indigo Snake (*Drymarchon melanurus*) and the Western Ribbonsnake (*Thamnophis proximus*) in Mexico. Map by Edgar E. Hernández-Juárez.

Table 1: Some food items reported for *Drymarchon melanurus* by other authors.

State / Department	Country	Prey	Citation
	Mexico; Guatemala; Belize	*Mesoscincus schwartzei*; *Lepidophyma flavimaculatum*; *Basiliscus vittatus*; *Boa constrictor*; *Ninia sebae*; *Pliocercus elapoides*; *Atropoides nummifer*; *Crotalus simus*; *Metlapilcoatlus mexicanus*	Lee, 1996; Campbell, 1998
La Guajira	Mexico; Belize	*Ninia sebae*	Greene, 1975
La Guajira	Colombia	*Mastigodryas pleei*	Daza-R, 2005
Nuevo León	Mexico	*Gopherus berlandieri*	Lazcano et al., 2005
Morelos	Mexico	*Crotalus simus*	Neri-Castro et al., 2012
Tamaulipas	Mexico	*Spilotes pullatus*	Hernández-Ríos et al., 2013
Chiapas	Mexico	*Metlapilcoatlus occiduus*	García-Padilla, 2015
Orange Walk District	Belize	*Mesoscincus schwartzei*	Platt et al., 2016
Campeche	Mexico	*Spilotes pullatus*	Oakley and Theodorou, 2020
Nuevo León	Mexico	*Salvadora grahamiae*	Montoya-Ferrer et al., 2020
Gigante, Huila	Colombia	*Micrurus dumerilii; Sibon nebulatus*	Zuñiga-Baos and Vera-Perez, 2020
Puntarenas	Costa Rica	*Bothrops asper*	Solórzano and Sasa, 2020

Espinal et al., 2018).

Thamnophis proximus is not endemic to Mexico and is listed by the IUCN as a species of least concern. It has an EVS score of 7 (low vulnerability species) and an "A" (threatened) status by the NOM-059 (SEMARNAT, 2010; Nevárez-de los Reyes et al., 2016).

Background on the study site

The Monumento Natural Cerro de la Silla Natural (MNCS) includes several native vegetation communities, such as Medium Sub-awnless Scrub, High Sub-awnless Scrub, Sclerophyllous Oak Forest, and Riparian Vegetation (Moya, 1982; Alanís-Flores, 2004; Velazco-Macías, 2009). The vegetation tends to be taller and more leafy on the eastern slope than on the western one, due to its direct contact with the prevailing humid winds from the east. According to Rzedowski (2006), the medium and high scrub form a single type called "Submontane Scrub." Based on this information, four types of vegetation are officially recognized: Submontane Scrub, Oak Forest, Riparian Vegetation and Secondary Vegetation. All of these plant communities are present in the Cañón Santa Ana.

Oak Forest: Located in the highest areas, 800–1000 masl. The trees are deciduous, of medium height (8 to 15 m) with sclerotic leaves. The community is made up of species of the dominant genus oak (*Quercus*) and other associated species, such as *Cercis canadensis* (eastern redbud), *Bauhinia lunarioides* (Anacacho orchid tree), *Osmanthus americanus* (devilwood), *Chioccoca pachyphylla* (snowberry), *Garrya ovata* (eggleaf silktassel), *Randia laetevirens* (indigoberry), *Vitis aestivalis* (summer grape), *Arbutus xalapensis* (madroño), and *Juglans regia* (English walnut).

Riparian Vegetation: Develops on the banks of rivers and is the least representative native vegetation within the MNCS. This vegetation type consists of small herbaceous plants and trees with heights of 8 to 15 m. The most common species in this community are *Salix nigra* (black willow), *Platanus occidentalis* (sycamore), *Melia azedarach* (chinaberry tree), *Celtis laevigata* (sugarberry), and *Pithecellobium flexicaule* (ebony blackbead).

Submontane Scrub: A prosperous plant community in relatively less arid climates (450 to 900 mm of annual rainfall). Generally tall (3 to 5 m) and dense, more or less evergreen vegetation that develops on shallow soils, in most cases formed by sedimentary rock. This vegetation type is the dominant plant community in the MNCS, of which the most representative species are the following: *Helietta parvifolia* (barreta), *Fraxinus greggii* (little-leaf ash), *Neopringlea integrifolia* (palo estaca), *Gochnatia hypoleuca* (shrubby bullseye), *Pithecellobium brevifolium* (Texas ebony), *Quercus fusiformis* (escarpment live oak), *Cordia boissieri* (Mexican olive), *Acacia rigidula* (blackbrush acacia), *Leucophyllum frutescens* (Texas sage), and *Acacia berlandieri* (guajillo).

Secondary Vegetation: This vegetation type occurs mainly in low-lying areas where human settlements and agricultural areas are located. According to González (2000), this vegetation includes various species that can be considered invasive to the Sierra Madre Oriental. Some of the species found in this community are *Cenchrus ciliaris* (buffelgrass), *Melinis repens* (Natal grass), *Megathyrsus maximus* (Guinea grass), *Ricinus communis* (castor oil plant), *Leucaena leucocephala* (white leadtree), *Andropogon gerardii* (big bluestem grass), *Sorghum halepense* (Johnson grass), *Arundo donax* (giant reed), *Prosopis glandulosa* (mesquite), *Salix nigra* (black willow), and *Ehretia anacua* (knockaway).

Discussion and conclusion

Although the herpetofauna of the state of Nuevo León has been documented widely with check lists and new findings (Lazcano et al., 1992; Lazcano et al., 1993; Lazcano et al., 2006; Chávez-Cisneros et al., 2014; Nevárez de los Reyes et al., 2016; Lemos-Espinal et al., 2016), diagnostic field guides (Lazcano-Villarreal et al., 2010; Lemos-Espinal et al., 2018), natural history notes (Lazcano and Jacobo Galvan, 1994; Dixon et al., 2011; Montoya-Ferrer et al., 2014; Rodríguez-Jaime et al., 2015; García-Padilla et al., 2016), and scientific publications on other specific topics such as herpetofauna in Nuevo León sierras or state protected areas (Contreras-Lozano et al., 2007; Lazcano et al., 2004; Lazcano et al., 2009; Contreras-Lozano et al., 2010; Contreras-Lozano et al., 2011; Contreras-Lozano et al., 2012; Lazcano et al., 2012; Banda-Leal et al., 2013; Banda-Leal et al., 2014; Farr et al., 2015; Lazcano et al., 2015; Lazcano and Quirino-Olvera, 2016; Lazcano et al., 2017. Nevárez de los Reyes et al., 2017; García-Bastida et al., 2018; Contreras-Lozano et al., 2019; Lazcano et al., 2020; de Luna et al., 2020), there are many regions that still need to be studied, including some very close to the Monterrey Metropolitan Area and therefore more susceptible to receiving pressure from humans, so any information in this regard is very valuable for the conservation of these sites and their species. In addition, we can assume that undocumented food items for any species must be taken every day. So, any information on new food items for different snake species is very important to document. In Table 1 we have cited some food items for *Drymarchon melanurus* from other authors.

Reflection

With the human population in the Metropolitan Area of Monterrey growing out of control, many vertebrate species will be eliminated from the new human settlements. The area is projected to grow from 12 municipalities to 18 by the year 2040, with a population of about 9.5 million inhabitants, something not easy to understand or imagine. The area Monumento Natural Cerro de la Silla Natural has become an island separated from other mountains that surround the Monterrey Metropolitan Area by the ever-increasing human population. Surely many events like the one described here will become rare to observe as the area becomes densely inhabited by humans.

Acknowledgments

We wish to thank Aldo Dávalos-Martínez for helping in obtaining literature to cite in the article. We would also like to thank our herpetological students for their work in the field and laboratory. We also are grateful to the local community members who now enjoy watching for and photographing members of the local herpetofauna and submitting their work to us so that we can report the results of that work. The community members visit these very beautiful habitat often. We wish that this local remains clean and preserved, because this brings many benefits to ourselves and to the species the inhabit this community.

Literature Cited

Alanís-Flores, G. J. 2004. Florística de Nuevo León. Pp. 243-258. *In*: I. Luna, J. J. Morrone and D. Espinoza, editors, Biodiversidad de la Sierra Madre Oriental. México, D.F.: Las Prensas de Ciencias.

Banda-Leal, J., D. Lazcano and M. Nevárez de los Reyes. 2013b. Notes on Mexican herpetofauna 19: Herpetofauna sympatric with *Gerrhonotus parvus* in San Isidro Canyon, Santiago, Nuevo León, Mexico. Bulletin of the Chicago Herpetological Society 48(2):13-19.

Banda-Leal, J., D. Lazcano, M. Nevárez-de los Reyes and C. Barriga-Vallejo. 2014. Notes on Mexican Herpetofauna 20: Potential herpetofaunal predators on *Gerrhonotus parvus* in the Canyon of San Isidro, Santiago, Nuevo León, Mexico. Bulletin of the Chicago Herpetological Society 49(2):17-23.

Campbell, J. A. 1998. Amphibians and reptiles of northern Guatemala, the Yucatán, and Belize. Norman: University of Oklahoma Press.

Chávez-Cisneros, J. A., S. Narváez-Torres, D. Lazcano and J. A. Contreras-Lozano. 2014. Notes on Mexican herpetofauna 21: Green ratsnake (*Senticolis triaspis*), a new record from Sierra "Cerro de la Silla" (Saddleback Mountain), Nuevo León, México. Bulletin of the Chicago Herpetological Society 49(4):41-44.

Contreras-Lozano, J. A., D. Lazcano and A. J. Contreras-Balderas. 2007. Notes on Mexican herpetofauna 10: The herpetofauna of three plant commnuities in the Sierra de Picachos, Nuevo León, Mexico. Bulletin of the Chicago Herpetological Society 42(11):177-182.

Contreras-Lozano, J. A., D. Lazcano and A. J. Contreras-Balderas. 2011. Distribución ecológica de la herpetofauna en gradientes altitudinales superiores del Cerro El Potosí, Galeana, Nuevo León, México. Acta Zoológica Mexicana (nueva serie) 27(2):231-243.

Contreras-Lozano, J. A., D. Lazcano and A. J. Contreras-Balderas. 2012. Herpetofauna of the Cerro El Potosi Natural Protected Area of Nuevo Leon, Mexico: Status of the ecological and altitudinal distribution. Natural Areas Journal 32(4):377-385.

Contreras-Lozano, J. A., D. Lazcano and A. J. Contreras-Balderas. 2019. Notes of Mexican herpetofauna 32: Status of the ecological and altitudinal distribution of the herpetofauna in the Sierra de Bustamante, Nuevo León, Mexico. Bulletin of the Chicago Herpetological Society 54(4):77-82.

Contreras-Lozano, J. A., D. Lazcano, A. J. Contreras-Balderas and P. A. Lavín-Murcio. 2010. Notes on Mexican herpetofauna 14: An update to the herpetofauna of Cerro El Potosí, Galeana, Nuevo León, México. Bulletin of the Chicago Herpetological Society 45(3):41-46.

Daza-R., J. M. 2005. Natural History Notes. *Drymarchon corais melanurus* (Indigo Snake). Diet. Herpetological Review 36(4):457.

de Luna, M., R. García-Barrios, E. Abdel Rivas-Mercado, D. Lazcano-Villarreal and D. Montoya-Ferrer. 2020. Las serpientes venenosas del noreste de México I. Cantil de Taylor (*Agkistrodon taylori*). Sociedad y Biología (6):5-15.

Dixon, J. R., D. Lazcano, J. Banda-Leal and J. A. Chávez-Cisneros. 2011. Notes on Mexican herpetofauna 17: The status of *Rhadinaea montana*, *R. gaigeae* and *R. quinquelineata* of the Sierra Madre Oriental of eastern México. Bulletin of the Chicago Herpetological Society 46(6):69-73.

Farr, W. L., M. Nevárez de los Reyes, J. Banda-Leal and D. Lazcano. 2015. The distribution of *Crotalus totonacus* in Nuevo León, Mexico. Mesoamerican Herpetology 2(3):242-251.

García-Bastida, M., D. Lazcano, J. A. Méndez-Tamez and L. D. Wilson. 2018. *Gerrhonotus infernalis* Baird, 1859 (1858). Predation by *Urocyon cineroargenteus* (Mammalia: Canidae). Mesoamerican Herpetology 5(1):157-159.

García-Padilla, E. 2015. Predation event and a distributional record for *Atropoides occiduus* (Hoge, 1966). Mesoamerican Herpetology 2(3):376–377.

García-Padilla, E., J. P. González-Botello, M. Nevárez-de los Reyes, D. Lazcano, V. Mata-Silva, J. D. Johnson and L. D. Wilson. 2016. Distribution Notes: *Coniophanes imperialis* (Baird and Girard, 1859). Mesoamerican Herpetology 3(3):776.

González, M. 2000. Deterioro de la vegetación nativa por el crecimiento urbano en el municipio de San Pedro Garza García, Nuevo León, México. Masters degree thesis, Universidad Autónoma de Nuevo León, Facultad de Ciencias Biológicas.

Greene, H. W. 1975. Ecological observations on the red coffee snake, *Ninia sebae,* in southern Veracruz, Mexico. American Midland Naturalist 93(2):478-484.

Heimes, P. 2016. Herpetofauna Mexicana 1: Snakes of Mexico. Frankfurt am Main, Germany: Edition Chimaira.

Hernández-Ríos, A., E. García-Padilla and A. Villegas-Nieto. 2013. Natural History Notes. *Drymarchon melanurus* (Central American Indigo Snake). Diet. Herpetological Review 44(4):690.

Hardy, L. M., and R. W. McDiarmid. 1969. The amphibians and reptiles of Sinaloa, Mexico. University of Kansas Publications, Museum of Natural History 18(3):39-252.

Lazcano, D., J. Banda, G. Castañeda-Gaytán, C. García-de la Peña and C. Solís Rojas. 2006. Notes on Mexican Herpetofauna 8: Herpetofauna of the Parque Ecológico Chipinque, Nuevo León, Mexico. Bulletin of the Chicago Herpetological Society 41(7) 117-123.

Lazcano, D., A. Contreras-Balderas, J. I. González-Rojas, G. Castañeda, C. García-de la Peña and C. Solís-Rojas. 2004. Notes on herpetofauna 6: Herpetofauna of Sierra San Antonio Peña Nevada, Zaragoza, Nuevo León, México: Preliminary list. Bulletin of the Chicago Herpetological Society 39(10):181-187.

Lazcano, D., J. A. Contreras-Lozano, J. Gallardo-Valdez, C. García del Peña and G. Castañeda. 2009. Notes on Mexican herpetofauna 11: Herpetological diversity in Sierra "Cerro de La Silla" (Saddleback Mountain), Nuevo León, México. Bulletin of the Chicago Herpetological Society 44(2):21-27.

Lazcano, D., J. Contreras-Lozano, S. Narváez-Torres, and J. Chávez-Cisneros. 2012. Notes on Mexican herpetofauna 18: Herpetofauna of Cerro El Topo Chico Natural Protected Area, Nuevo León, México. Bulletin of the Chicago Herpetological Society 47(12):149-155.

Lazcano, D., C. García-de la Peña, G. Castañeda and I. González-Rojas. 2005. Natural History Notes. *Drymarchon corais* (Indigo Snake). Diet. Herpetological Review 36(2):193.

Lazcano, D., J. A. García-Salas, J. Banda-Leal, L. D. Wilson, S. Favela-Lara, M. E. Solís-Barajas and S. Pacheco-Treviño. 2020. Notes on Mexican herpetofauna 34: Herpetofauna associated with pine forests in Nuevo León, Mexico. Bulletin of the Chicago Herpetological Society 55(2):27-39.

Lazcano, D., and R. D. Jacobo Galvan. 1994. A Mexican live herpetological collection. Litteratura Serpentium 14(3):74-77.

Lazcano, D., A. Kardon and K. Peterson. 1992. Notes on Mexican herpetofauna 1: *Senticolis triaspis* and *Trimorphodon tau*. Bulletin of the Chicago Herpetological Society 27(1):4.

Lazcano, D., S. Pacheco-Treviño, M. Nevárez de los Reyes, J. Banda-Leal and C. Barriga-Ibarra. 2015. Notes on Mexican herpetofauna 25: Associations of herpetofauna with agaves in the states of Nuevo León and Tamaulipas, Mexico. Bulletin of the Chicago Herpetological Society 50(6):77-86.

Lazcano, D., K. H. Peterson and A. Kardon. 1993. Notes on Mexican herpetofauna 2: Reproduction in the northern Mexican bullsnake, *Pituophis deppei jani* (Cope). Bulletin of the Chicago Herpetological Society 28(10):209-211.

Lazcano, D., and R. Quirino-Olvera. 2016. Sotols and beargrass involved in herpetological activity in the state of Nuevo Leon, Mexico. Planta (22):29-38. Universidad Autónoma de Nuevo León. Julio-Diciembre 2016.

Lazcano, D., R. Quirino-Olvera, M. Nevárez de los Reyes, and J. Banda-Leal. 2017. Notes on Mexican Herpetofauna 29: Association of herpetofauna with sotols and beargrass in the state of Nuevo Leon, Mexico. Bulletin of the Chicago Herpetological Society 52(2):17-26.

Lazcano, D., A. Sánchez-Almazán, C. García-de la Peña, G. Castañeda and A. J. Contreras-Balderas. 2007. Notes on Mexican Herpetofauna 9: Herpetofauna of a Fragmented *Juniperus* Forest in the State Natural Protected Area of San Juan y Puentes, Aramberri, Nuevo León, Mexico. Bulletin of the Chicago Herpetological Society 42(1):1-6.

Lazcano-Villarreal, D., J. Banda-Leal and R. D. Jacobo-Galván. 2010. Serpientes de Nuevo León. Monterrey, Nuevo León, Mexico: Universidad Autónoma de Nuevo León.

Lee, J. C. 1996. The amphibians and reptiles of the Yucatan Peninsula. Ithaca, New York: Cornell University Press.

————. 2000. A field guide to the amphibians and reptiles of the Maya world. Ithaca, New York: Cornell University Press.

Lemos-Espinal, J. A., and J. R. Dixon. 2013. Amphibians and reptiles of San Luis Potosí. Eagle Mountain, Utah: Eagle Mountain Publishing, LC.

Lemos-Espinal, J. A., G. R. Smith and A. Cruz. 2016. Amphibians and reptiles of the state of Nuevo León, Mexico. Zookeys 594: 123-141. <https://zookeys.pensoft.net/article/8289/>

Lemos-Espinal, J. A., G. R. Smith and A. Cruz. 2018. Amphibians and reptiles of Nuevo León, Mexico. Rodeo, New Mexico: ECO Herpetological Publishing and Distribution.

Lemos-Espinal, J. A., H. M. Smith, J. R. Dixon and A. Cruz. 2015. Anfibios y reptiles de Sonora, Chihuahua y Coahuila, México / Amphibians and reptiles of Sonora, Chihuahua and Coahuila, Mexico. Volume II. Mexico, D.F.: Comisión para el Conocimiento y Uso de la Biodiversidad (CONABIO).

Montoya-Ferrer, D., D. Lazcano and M. García-Bastida. 2014. Notes on Mexican herpetofauna 23: An unusual injury to a Texas Alligator Lizard (*Gerrhonotus infernalis*) in Parque Ecológico Chipinque, San Pedro Garza García, Nuevo León, Mexico. Bulletin of the Chicago Herpetological Society 49(9):125-126.

Montoya-Ferrer, D., D. Lazcano, M. E. Solis-Barajas and L. D. Wilson. 2020. Natural History Notes. *Drymarchon melanurus* (Central American Indigo Snake). Diet. Herpetological Review 51(4):863-864.

Morales-Sánchez, A., and L. M. Guevara-Chumacero. 2016. La culebra índigo, más azul que el cielo. Especies, Revista sobre Conservación y Biodiversidad 25(1):16-19.

Moya, J. G. 1982. Estudio descriptivo y florístico de las unidades sinecológicas de la Sierra de La Silla, Nuevo León, México. Bachelor's degree thesis, Universidad Autónoma de Nuevo León, Facultad de Ciencias Biológicas.

Neri Castro, E. E., C. A. Montalbán Huidobro and S. Aréchaga Ocampo. 2012. Natural History Notes. *Drymarchon melanurus* (Central American Indigo Snake). Diet. Herpetological Review 43(4):659.

Nevárez de los Reyes, M., D. Lazcano, J. Forks, C. A. Alejo-Luna, and B. Navarro-Velázquez. 2017. Notes on the herpetofauna of Mexico 30: A new food item for the Gray-banded Kingsnake, *Lampropeltis alterna* (A. E. Brown, 1901). Bulletin of the Chicago Herpetological Society 52(4):61-65.

Nevárez-de los Reyes, M., D. Lazcano, E. García-Padilla, V. Mata-Silva, J. D. Johnson and L. D. Wilson. 2016. The herpetofauna of Nuevo León, Mexico: Composition, distribution, and conservation. Mesoamerican Herpetology 3(3):558-638.

Oakley, J., and A. Theodorou. 2020. A failed predation attempt by a Central American Indigo Snake (*Drymarchon melanurus*) on a Tiger Ratsnake (*Spilotes pullatus*) in Campeche, Mexico. Reptiles & Amphibians 27(3):494-495.

Platt, S. G., T. R. Rainwater, J. C. Meerman and S. M. Miller. 2016. Notes on the diet, foraging behavior, and venom of some snakes in Belize. Mesoamerican Herpetology 3(1):162-170.

Rodríguez-Jaime, A., D. Lazcano, J. Banda-Leal and M. Neveras de los Reyes. 2015. Notes on Mexican herpetofauna 24: Unusual food items in the diet of the American Black Bear, *Ursus americanus eremicus* (Pallas, 1790), in Parque Ecológico de Chipinque, Nuevo Leon, Mexico. Bulletin of the Chicago Herpetological Society 50(1):1-7.

Rossman, D. A., N. B. Ford and R. A. Seigel. 1996. The garter snakes: Evolution and ecology. Norman: University of Oklahoma Press.

Rzedowski, J. 2006. Vegetación de México. 1ra. edición digital. CONABIO (Comisión Nacional para el Conocimiento y Uso de la Biodiversidad). <http://www.biodiversidad.gob.mx/publicaciones/librosDig/pdf/VegetacionMx_Cont.pdf>

SEMARNAT (Secretaría del Medio Ambiente y Recursos Naturales). 2010. Norma Oficial Mexicana NOM-059-SEMARNAT-2010. Protección ambiental—Especies nativas de México de flora y fauna silvestres—Categorías de riesgo y especificaciones para su inclusión, exclusión o cambio—Lista de especies en riesgo. Publicada el 30 de Diciembre 2010.

Solórzano, A., and M. Sasa. 2020. Natural History Notes. *Drymarchon melanurus* (Central American Indigo Snake). Diet. Herpetological Review 51(4):864-865.

Vázquez-Díaz, J., and G. E. Quintero-Díaz. 2005. Anfibios y reptiles de Aguascalientes (second edition). Mexico, D.F.: Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO) and Centro De Investigaciones y Estudios Multidisciplinarios de Aguascalientes (CIEMA).

Velazco-Macías, C. 2009. Flora del estado de Nuevo León, México: Diversidad y análisis espacio-temporal. Doctoral thesis. Facultad de Ciencias Biológicas, Universidad Autonoma de Nuevo León.

Wüster, W., J. L. Yrausquin and A. Mijares-Urrutia. 2001. A new species of indigo snake from north-western Venezuela (Serpentes: Colubridae: *Drymarchon*). Herpetological Journal 11: 157-166.

Zúñiga-Baos, J. A., and L. E. Vera-Pérez. 2020. Natural History Notes. *Drymarchon melanurus* (Central American Indigo Snake). Diet. Herpetological Review 51(4):864.

Bulletin of the Chicago Herpetological Society 56(10):185-186, 2021

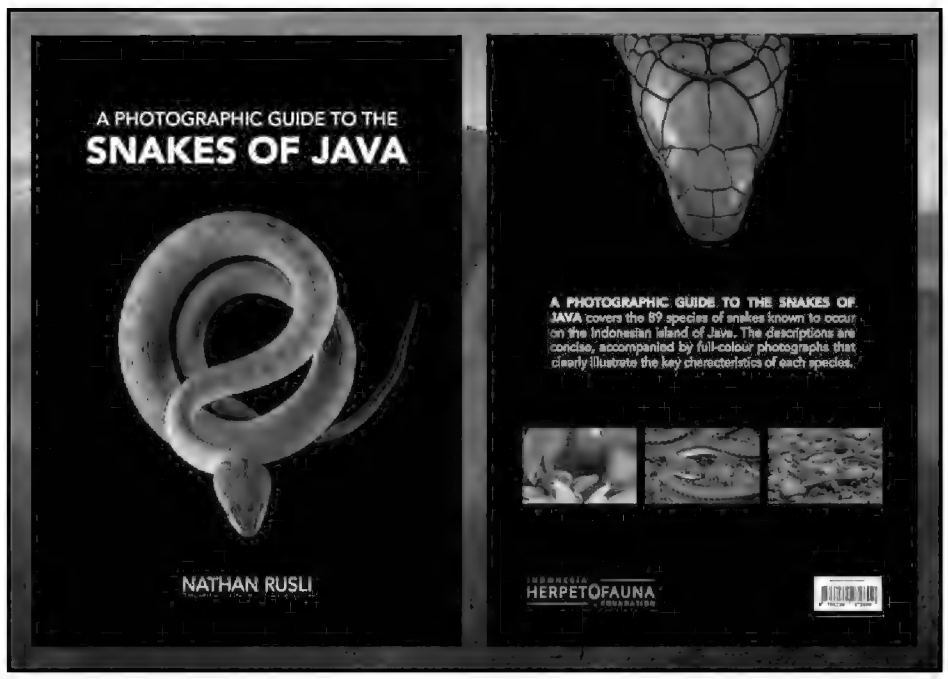
Book Review: *A Photographic Guide to the Snakes of Java* by Nathan Rusli

2020. 143 pp. Indonesia Herpetofauna Foundation. ISBN 978-623-92726-1-6 Softbound. Available for $39.99 from Savethesnakes.org.

Eric W. Stitt
ECORP Consulting, Inc.
2525 Warren Drive
Rocklin, CA 95677
estitt@ecorpconsulting.com

(Disclosure: Eric Stitt is a board member of Savethesnakes.org, which provided partial funding for the project being reviewed here)

Java is a volcanic island nation, the 13th largest in the world, situated at the southern edge of the Malayan Peninsula. It is the most densely populated island in the region, with 145 million people packed among its 50,156 square miles, and it has an elevational range from sea level to 12,000 ft above sea level. With an average latitude of 7.6° South, the island is tropical and includes mangrove marshes, wet tropical rain forests, savannahs, cloud forest, and others among its habitats. Java figures significantly in the biogeographical literature. It is the southernmost large island on the Sunda Shelf, a landmass, now covered by shallow seas, that connected islands west of Wallace's Line to mainland Asia during the early Holocene. Bali and then deep water occur to the east, and as a result the biotas differ greatly across the invisible line. In *A Photographic Guide to the Snakes of Java*, author Nathan Rusli documents the incredible snake diversity of the island.


A PHOTOGRAPHIC GUIDE TO THE
SNAKES OF JAVA
NATHAN RUSLI
A PHOTOGRAPHIC GUIDE TO THE SNAKES OF JAVA covers the 89 species of snakes known to occur on the Indonesian island of Java. The descriptions are concise, accompanied by full-colour photographs that clearly illustrate the key characteristics of each species.
HERPETOFAUNA

A Forward by Dr. Wolfgang Wüster introduces us to the author and the aims of the *Photographic Guide*. This is followed by the author's brief Introduction, in which Rusli provides his motivation and gives geographical and cultural context for the resulting book. Ten pages of morphological descriptions and definitions precede the species accounts, accompanied by stellar photographs describing scalation and dentition.

A brief How to Use This Book section occurs immediately prior to the Species Accounts at the heart of the book. In all, 89 snake species known from Java are described and pictured in the guide. For most families, there is an identification key and general descriptions of the habitat, ecology, venom apparatus, and venom composition of the group (save, incongruously, for the elapids). Further parsing of characteristics and commonalities often (but not always) occurs at the generic level. Standard accounts for each species consist of common name(s), Indonesian name(s), identification, maximum size, conservation status, and notes. One or more full-color photographs accompany each account, which point out key identifying characteristics. Scale morphology, dentition, and standard descriptive views are all outlined in detail and precisely described, providing a solid foundation for any person who wishes to identify a snake. Head scalation is documented particularly well.

After the species accounts, Rusli provides a helpful comparative section, allowing close scrutiny between similar appearing species, especially with regard to venomous / nonvenomous look-alikes. Another section describes snakebite first aid (a

small section, but accurate); then References, Acknowledgements, and an Author Profile close out the book.

All photographs are in full color and well-composed. Most photographs are of live snakes, but as acknowledged by Rusli, some are by necessity of preserved specimens (e.g., *Oligodon propinquus*, p. 103, and *Calamaria virgulata*, p. 66, are both holotypes). Another specimen appears to be a road mortality (*Gongylosoma longicauda*, p. 68). In some instances, color pencil drawings take the place of photographs (e.g., *Pseudoxenodon inornatus*, p. 51, *Calamaria bicolor*, *C. javanica*, *C. lateralis*, pp. 59, 60, 61, respectively). The author deserves credit for beating the bushes (so to speak) to procure visual representations for all species, no matter how uncommon (i.e., the aforementioned *Calamaria virgulata*—a Javan endemic known only from the holotype). Standout photographs show the enlarged rear teeth of the kukri snakes (*Oligodon* spp., p. 100), as well as the three fang types found in colubrids, elapids and viperids.

Beyond its intended function as a photographic handbook, it strikes me that *A Photographic Guide to the Snakes of Java* provides a great tour of snake morphological diversity. To wit: Java harbors two of the most revered / charismatic snakes known to science: the reticulated python (*Malayopython reticulatus*), famed for its gorgeous pattern, its incredible (potential) maximum size, and infrequent (but documented) human culinary tendencies, and the king cobra (*Ophiophagus hannah*), our largest venomous snake, also known for its maternal tendencies as the only nest-building ophidian. Add to this the myriad fossorial forms, arboreal specialists and so on, and top it off with the spectacularly strange dragon snake (*Xenodermus javanicus*) and you've got many terrestrial shapes and sizes well-represented (note: sea snakes are not included).

Even if Java is not on one's upcoming travel itinerary, *A Photographic Guide to the Snakes of Java* stands as a great addition to one's herpetological library. For an armchair biogeographer like me, I found *A Photographic Guide* to be a welcome addition to my literature. It now sits on my bookshelf beside my reprints of *The Malay Archipelago* (Wallace, 1869), *The Geographical Distribution of Animals* (Wallace, 1876), and *Island Life* (Wallace, 1880) as an incentive to finally start planning my own "bucket list" herpetological expedition.

Literature Cited

Wallace, A. R. 1869. The Malay Archipelago: The land of the orang-utan, and the bird of paradise. A narrative of travel, with studies of man and nature. London: Macmillan and Co. [Dover Publications reprint, 1962].

————. 1876. The geographical distribution of animals; with a study of the relations of living and extinct faunas as elucidating the past changes of the Earth's surface. New York: Harper and Brothers. [Hafner Publishing Co. reprint, 1962].

————. 1881. Island life, or, the phenomena and causes of insular faunas and floras: Including a revision and attempted solution of the problem of geological climates. New York: Harper and Brothers. [Prometheus Books reprint, 1998].

Bulletin of the Chicago Herpetological Society 56(10):187-194, 2021

Desert Iguanas from Sand Dunes to Saguaros: Comparing Observations between California and Arizona—Part 1

Roger A. Repp
9044 N. Valgrind Lane
Tucson, AZ 85743
repproger22@gmail.com

A few days ago, I got to meet one of my neighbors. Were he to tell the story of how we first met, he would doubtless begin by explaining that there was this asshole in an orange Subaru stopped in the middle of the road, partially blocking his driveway. He had witnessed this same vehicle go slowly past his house twice within the past half-hour. Now on the third slow-roll past his house, this same asshole actually stopped, was pointing a camera at his ramshackle double-wide, and was taking photos of the place. This was occurring because the fella was clearly casing his lordly estate for a future robbery. The author knows all these things *not* because he is a mind reader. I heard these very words abruptly spew out of my neighbor's gullet as an opening to our dialogue. Apparently, rather than simply asking "Do you mind if I ask you what you are doing?," he felt it more apropos to just open his cake hole and let it *all* hang out.

We now tell the story of our meeting from the perspective of the guy in the orange-colored Subaru Crosstrek. You know—the guy who was casing his neighbor's double-wide? That guy would be me! The date our little tête-à-tête transpired was 3 September 2021, at precisely 1145 hours. My vehicle was rolling along at five miles per hour as I patrolled a quiet residential street, and my eyes were sweeping left, dead ahead, up to the rear-view mirror, and right—all at a much faster pace than my imperceptible crawl forward. I began to slow down (if that is possible at 5 mph) when, at a distance of 30 meters or so, I saw an elongate tan-brown shape begin to waddle across the road in front of me. I knew it was a Desert Iguana (*Dipsosaurus dorsalis*) [hereafter "Dipso"] long before my eyes could focus on it. The size alone—roughly 35 cm (~14 inches) total length—would be almost enough to make that call. But I sometimes see Leopard Lizards (*Gambelia wislizenii*) in this vicinity, and they are of equal size. No, how I knew this was a Dipso was the way it threw its little Dipso hips from side to side as it slowly swaggered forward. When they are not in hurry, they shake that bootie like a Sunset Strip hooker—and look *good* doing it! How I *love* to watch them strut! When they *are* in a hurry, the hip-swaying motion morphs into something far more linear, and the tail flies straight out behind, slightly upraised from whatever substratum the lizard is blazing across. But this one was in no hurry. It performed its sexy swagger for me, traveling across the road from my left to my right. It only stopped moving when it slipped into a shady patch of ground under the canopy of a creosote bush. I now *almost* had a sitting duck of a photo opportunity. It would have been better had it settled on open ground in direct sunlight, or on the left, driver's side of the vehicle. But one must take what one can get where Dipsos are concerned. I would have to be content to pull abreast of the lizard, lean well over to my right, and fire away out the passenger side window of the vehicle. (Thank goodness for power windows.)

But you can't just witlessly stop and take pictures on a residential street—especially when the roads are narrow and you must park at somewhat of an angle. (And *holy smoke* do some of you herpers ever lack finesse when doing this!) Once parked, you next must not only find the subject in your LCD viewfinder (which with my turd of a camera is no mean feat), you must constantly check ahead and behind to make sure that you are not pissing anybody off while you thusly block a thru-fare. With this particular lizard, I was on top of that game. Then, in my rear view mirror, I saw that big ass, gas-guzzling, tan-colored diesel 1970s Ford F150 republican-mobile come roaring up behind me like there was no tomorrow. I adroitly *tried* to diffuse the situation by giving up on the photo op, zipping forward, and swinging into a pullout that was roughly 50 feet ahead. I did all this so deftly that the truck did not even have to slow down to get around me. My plan was to whip a quick U-turn as soon as the truck passed by, and try for that lizard again. But nope! That didn't happen because the truck did *not* pass me by. It instead pulled alongside of me, smothering both vehicles with the toxic diesel smoke that comes as an accessory to such junkyard relics. Behind the wheel of this clinking, clanking, sputtering, rumbling and stinky piece of shit was a crusty old dude. I would guess him to be in his seventies, like his truck. He was big—not fat, just big. The face under that gray crew-cut looked like it had absorbed many a punch, and his visage reflected the downturned jowls of a man accustomed to wearing a perennial scowl. He was broad across the shoulders, and as he began to verbally articulate a wild waving of the arms occurred. Having a stellar view of his right profile, I couldn't help but notice that his right hand was the size of a ham, and that his right arm nearly reached the passenger window while he was wildly gesturing his exasperation. And *man* did he ever have a blow on him! If the rest of the world spoke as forcefully as he did, I could throw my hearing aids away! That powerful set of pipes initiated the discussion with:

"**Blah, blah, you *effing* son of a female dog, filth foul, *past my house twice*, casing my house, curse cuss, blocking my driveway, I've been robbed twice, blah blah blah etc.**"

As big as my mouth is, I could not talk over the dude. As soon as he wound down, I interjected "Sir!" I then spread my fingertips a distance of roughly 14 inches. "There is a lizard about this long behind me. Maybe you have seen them in your yard before?" He didn't respond, so I kept going. I then lifted my camera and started to say "I was trying to get a picture…" But that was as far as I got. Showing him the camera was a mistake, and brought on round 2 of the ranting and raving.

"**BLAH, BLAH—*see—I effing knew it*! You were taking pictures of my house to rob me! Blah blah curse cuss growl, poxes on nosy fornicators, effing thieves and spies, effing rich ahole neighbors, etc.**"

As soon as he wound down again, I tried a different tactic. I grabbed my herp journal, which was on the seat beside me. I always clip a pen to the page I'm on, so that it immediately opens to the proper page. And page 41 was damn impressive, if I say so myself. It contained line after line of Dipsos, from the top of the page down to the second to the last blank line on the page. I held my journal out the window, pages displayed toward him. I once again explained to him that I was photographing lizards. I started reading off some of the Dipsos I had seen in his neighborhood. "…and this one was a fat female just two blocks west of here…and this one was also fat, and feeding on some spurge…here it speaks of one missing a tail, saw that one five minutes ago…and do you see this blank line? *That* is where I am going to log in the lizard that was in your driveway!"

Just like *that*, the dude's countenance turned. He was suddenly all sorts of apologetic, promised not to bother me again, and rumbled off before I could say anything more. But n*ow* I actually wanted to talk to the dude. His acreage was full of downed sheets of tin, tumbled-down shacks, weathered plywood sheets and junked cars. It would be a fine place to flip for herps come spring. I was thinking of following him, prominent NRA sticker on the rear bumper and all, but opted to U-turn back for the Dipso instead. It was of course long gone. But I know where the dude lives now. *Now* I *am* casing the joint, but certainly not to rob him. Sooner or later, I'll see him out and about in his yard. I will chat him down so sweetly with talk of God, guts, guns and glory. I might even sing him a couple of lines from a Merle Haggard song. One fine day, he will be my buddy. For now, I'm still trying to figure out how to inspire him to flip some stuff in his yard for me. (What with my bad back and all.)

Some initial thoughts on Dipsos in California versus Dipsos in Arizona

In 1989, when it was first determined that I would start taking notes of herpetological finds in the field, I first had to decide *what* I would record. After about 30 seconds of thought on the matter, I made the decision that all snakes, all turtles, and five species of lizard would be documented. This was merely a "what we found and when we found it" sort of list. The five lizard species to make the "chosen few" list of mine were Gila Monsters (*Heloderma suspectum*), Collared Lizards (*Crotaphytus collaris*), Leopard Lizards (*Gambelia wislizenii*), Desert Iguanas (*Dipsosaurus dorsalis*), and Chuckwallas (*Sauromalus ater*). These five types of lizard were chosen because in my mind, they were just as cool as snakes. And why were they so cool? Because they were *all* above average, of course! But what *really* made them above average in my mind could be summed up in one word: Size! (Figure 1). With the exception of Collared Lizards, all are capable of reaching a total length of ~16 inches (~406 mm) or more. At ~14 inches (~356 mm) maximum, Collared Lizards are not quite as long as the others. But their stocky build, huge, chunky head, and *magnificent* colors earn them their place on my greatest hits list. At the time, I also considered all five of these lizards to be rare, or at least, only rarely seen.

We now *reluctantly* drop all discussion on the other four species, and zero in on the Dipsos. As is *always* the case when discussing local herps that I barely understand, I click my way

Figure 1. A large adult male Desert Iguana (*Dipsosaurus dorsalis*) shown in the hand for size perspective. This dandy was captured in Maricopa County, Arizona, 20 April 1991. Image by Fred Wilson.

into the Tucson Herpetological Society (THS) website as my first stop. I was greatly pleased to note that the account on Desert Iguanas was written by Dr. Robert Bezy, Curator Emeritus of the Natural History Museum of Los Angeles County. As I read his words, I was once again reminded of the quality of people whom I once worked and played with when I was active with the THS. "Easy Bezy" was what I used to jokingly address him as. Good old Easy Bezy even has a lizard named after him. We speak of Bezy's Night Lizard (*Xantusia bezyi*). Believe it or not, for a time, Bob was our secretary, while *EYE* was his president! ("Yeah, right! I'm the boss—do whatever I say, Easy Bezy." Not hardly.) Bob's account on Dipsos is exquisitely written, jam-packed with style, finesse, wisdom and a downright explosive Literature Cited section. As already suggested, it was written at a time when the THS had its act together. We had thinkers who were also doers, which is a *very* rare combination where herp societies are concerned. During the 2010 time period under discussion, the normal progression to get a species posted on our website was to first publish an article on that species in our newsletter, the *Sonoran Herpetologist* (SH). Shortly after publication in the SH, the article would migrate over to the THS Website. Dr. Bezy followed that progression: SH article to THS website. His article appeared in the October 2010 issue of the *Sonoran Herpetologist*. I am uncertain as to how long it took to make it from the SH to the THS Website, but I *am* certain it is up there now. References to Easy Bezy's article in the SH, as well as the THS Website, will be included in the Literature Cited section of Part 2 of this column.

In the early going of Bob's 2010 SH article (and subsequent website treatise), he has this to say: "As is the case for most lizards, little published research exists for Arizona's populations, and the effect of the monsoons and summer annuals can be estimated only by a few observations in Baja California Sur." He said a mouthful here. If we want to discuss what is going down with Dipsos in Arizona, we need to look at Baja California?

Figure 2. "I'm gonna soak up the sun." About the time that most other lizards call it a day, Desert Iguanas are beginning to sunbathe just outside of their burrows in order to heat their inner engines. Image by Jim Rorabaugh.

Yep! That's what the man said. Like so many other species of herp in Arizona, there is virtually *nothing* published on them locally here. Those familiar with my columns will *know* that I bring this up at least every other month—about *way* more than lizards. It is refreshing to see somebody else say it. How bad is it here? We only need to look at Bob's Literature Cited section to get the idea. I did a very quick count of the papers he lists, and came up with 61. But of these 61 papers, would the reader care to guess how many are Arizona-based? Three! And not a one of those is based on anything at all near Tucson. The three Arizona-based papers are all based on populations over a thousand feet lower in elevation than my own sweet spots.

But to ignore the *fabulous* work done with Dipsos in California would pay *everybody* a huge disservice. (It wouldn't do everything that we collectively know about Dipsos any good either!) Without further ado, let's *briefly* jump into Bob Bezyland together. He leads off with a colorful paragraph that says Dipsos like it hot. How hot? Back in 1953, a gentleman by the name of Ken Norris got a cloacal body temperature of 46.4°C (116°F). That is the highest body temperature ever recorded for a reptile. And to think that data came from up a hot lizard's ass right into your living room! In his colorful introductory paragraph, Bob also mentions that Dipsos are just beginning to bask at the mouths of their burrows while other lizards are calling it a day (Figure 2). According to Bezy, Mr. Norris also highlighted the fact Dipsos are closely associated with creosote bush (*Larrea tridentata*). That is likely because the blossoms are a major part of the diet of these largely herbivorous lizards. (Bezy, 2010; Norris, 1953). And good old (old as in reaching ripe old ages of thousands of years) creosote bush can be found in abundance in California, Arizona, and Mexico. To be sure, "greasewood" as creosote is also often called, extends all the way to Texas, which is well to the east of the presently-known easternmost extent of the range of Dipsos. If we zero in on the latitude at the northernmost edge of Tucson, we not only find my house, we also find the easternmost edge of the range of

Figure 3. Desert Iguana conveniently staked to an organic meat-rack provided by a creosote bush (*Larrea tridentata*). This is the work of a songbird, *Lanius ludovicianus*, also known as the loggerhead shrike. Shrikes are a significant predator of *Dipsosaurus dorsalis*. Note that the considerate birdie surrounded the corpse with flowers. Image by Jim Rorabaugh.

Dipsos! In fact, I can just about draw a line in the sand at the point where everything to the east is Dipso-less. Bob also mentions that Dipsos have long tails. Among other things, this feature helps them to maintain balance when they go arboreal. Right now, I'd *kill* to be able to show you one that is in the act of climbing, but alas, I don't have any images of a creosote-climbing Dipso. But I *do* have something that shows one with a long tail that has gone arboreal in one. The only complication with *that* is that the Dipso was placed there by that murderous songbird, *Lanius ludovicianus*, also known as the loggerhead shrike (Figure 3). Mark Fisher (pers. comm.) reports seeing a total of five shrike-killed Dipsos between the years 1985 to 2019 in the Coachella Valley. He was working with Al Muth and Cameron Barrow (look for Mark, Al and Cam in the words ahead) on a world's record long-term study on Fringe-toed Lizards (*Uma inornata*). Three different types of herps falling victim to these amazing birds have now been mentioned in these columns. The first was a Flat-tailed Horned Lizard (*Phrynosoma mcallii*), the second was a Gophersnake (*Pituophis catenifer*), and now it's Desert Iguanas (*Dipsosaurus dorsalis*). While on the topic, I will also mention that I also observed a shrike snag a young Western Patch-nosed Snake (*Salvadora hexalepis*) off a gravel road directly in front of my vehicle. The shrike then flew on the right side of the road once it claimed its prize, and I was actually able to drive alongside of it for at least 30 seconds. The snake was alive, but not well. It was writhing in pain, clamped in the sharply-hooked beak of the bird. But of all four observations, the Dipso shown in Figure 3 is the most impressive kill. That's a lot of lizard for a small bird to manhandle and hang out to dry.

Upon reading Dr. Bezy's handiwork, I picked off many names of people who I knew, and began to email them. There then ensued two solid weeks of communication with these people. It was wonderful, and I learned *a bunch* of stuff about Dipsos—*all of it from California*! But all this typing and talking set this column back two weeks. Now I have probably pissed them all off, because I told them "*no mas*! I still have to write this thing, you know?" On top of that distraction, I also pulled in six papers—California-based—that I have either read completely, or have started to read. It was on 21 September 2021 that I decided to make this a two-part column. This will give me the time to read more, and have more to say on the subject matter. Meanwhile, we continue with a *great* paragraph written by Jeff Howland. Like so many other members of the animal kingdom, the male Dipsos fight for territorial and mating rights. (Boys will be boys.) What I love about email are those rare occasions when something fantastically spontaneous erupts from the fingertips of the sender. Jeff knocked one out of the park with his written description of the violence involved with Dipso combat. We were discussing one of my images of two males squaring off. That image will be shown in part 2. But after discussing the pre-fight display in my image, Jeff turned loose with the following fusillade describing his eyewitness accounts of dueling Dipsos:

"Occasionally they will progress into combat, in which case they each bite the other on the thigh, anti-parallel to each other. In this case, because the one on the right is closer to you than the one on the left, they would grab each other by the rear right thigh. Then all hell breaks loose. Lots of twisting and spinning, a literal dust cloud with tails flailing. It looks like the Tasmanian devil in Bugs Bunny. I've witnessed full blown combat maybe 6 or 8 times (once in the middle of a highway). Both males generally come out of it with bloody thighs, hence the omnipresent scarring in adult males that I mentioned in an earlier email. It's quite violent and sometimes there is significant damage with flaps of skin and even muscle hanging off. My friend Roger Anderson, who has been working on lizards in Southern California for decades, found one with its leg torn off. I once found one that had a healed hole about 5 mm wide all the way through the thigh" (Jeff Howland, pers. comm.) Jim Rorabaugh (pers. comm.) stated that he also observed something similar. They were "biting each other, rolling around, and there was a lot of blood."

Yehaw! I guess that's what comes from eating nothing but salads every day. It can ruin one's disposition, and make one downright *nasty*. "The lady is mine, and *you* just pissed me off! Now I'm going to tear your leg off!" I personally have never seen the leg-scarring that Mr. Howland speaks of. But then again, I seldom get close enough to notice. As the reader has already noted, my neighbors get edgy over my dinky little point-and-shoot (and pray) camera. What would happen if they saw me pointing binoculars in the general direction of their homes? (On 15 September 2021, I had yet another confrontation with another of my neighbors. This time it ["it" being properly used here] was a skinny, skuzzy crack-head of a vile wench from hell. She was *all* skin and bones and green teeth and *nasty*. It is well that the Dipso season is nearly over, as methinks I'm liable to get my sorry ass shot!)

Figure 4. Proof that Desert Iguanas are both insectivores and scavengers. This one is devouring the carcass of a white-lined sphinx moth. Image by Jim Rorabaugh.

I have just called Dipsos salad eaters, and earlier on I called them "largely herbivorous." Before I became better educated on the matter of their diet, I used to call them "herp cows of the desert." But I am gradually learning that Dipsos are omnivores. Indeed, when the opportunity presents itself, they won't hesitate to snag some protein, whether it is alive or not (Figure 4). While on the topic of Dipsos being meat eaters, Jim Rorabaugh (pers. comm.) told me "I think people might underestimate the amount of insects in their diet . . . I think it was Randy Babb and/or Tom Brennan who told me about Dipsos eating white-lined sphinx moth caterpillars in the Yuma Desert . . . When I was a kid, I kept some dipsos in a cage. One was a captive for at least 8 years. They loved yellow skipper butterflies . . . I'd throw them in the cage, and the Dipsos would go crazy." In an all-out effort to assist with this column, Mark Fisher created a spreadsheet of every cool Dipso sighting to pass before his eyes. In all, there are 144 rows on his labor of love. I have been blessed to use whatever I see fit. Mother Repp never raised a child so foolish as to turn down such an offer! There are three references to Dipsos eating carrion. Two of these were rodents (likely already dead—my words, not Mark's), and one was an incident of a dead cicada going down the hatch. I have saved the best for last. On 26 July 2001, Mark witnessed an adult female choking down a younger Dipso. ***Cannibal Dipsos*?** Yeah baby, you go girl! If you can't teach your children well, simply eat them well. You'll save yourself a lot of trouble!

We will use cannibal Dipsos as a segue into discussing their predators. Just about anything that can eat them does. Jeff Howland witnessed five different predation events during his three year study at Desert Center, near Riverside California. One of these was good old *Lanius ludovicianus*. The vicious little birdie was so inconsiderate that it snagged and flew off with one of Jeff's Dipsos before he could identify it as being marked! Two other Dipsos were sent off to dirt nap land and converted to useful snake mass by Coachwhips (*Masticophis flagellum*). Jeff also witnessed a large adult Western Whiptail (*Aspidoscelis tigris*) choke down a hatchling Dipso (Howland, 1988). Moving right along, Mr. Howland also witnessed and photographed a Long-nosed Leopard Lizard (*Gambelia wislizenii*) capture and consume a juvenile Dipso. (Howland 1988). In this case, both lizards were individuals that he had previously marked.

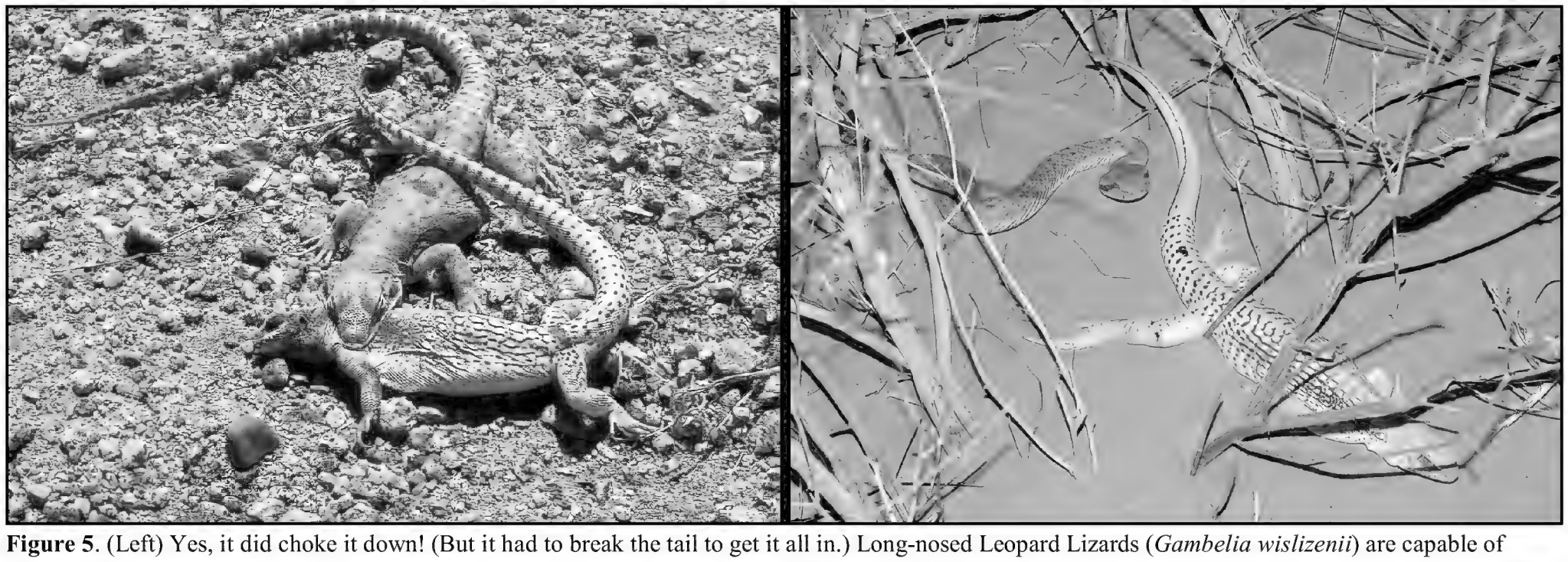


Figure 5. (Left) Yes, it did choke it down! (But it had to break the tail to get it all in.) Long-nosed Leopard Lizards (*Gambelia wislizenii*) are capable of snake-like feats of eating. Note that both predator and prey were previously marked. Image by Jeff Howland, at his study plot near Desert Center, Riverside County, California. (Right) "Are you dead yet? If not, hurry up. I'm hungry!" A Sidewinder (*Crotalus cerastes*) lurks behind a fresh kill. Note the signs of envenomation on the rear right leg of this unfortunate Desert Iguana. Image by Jim Rorabaugh.

(Figure 5, left side). Since we can, we also include a Jim Rorabaugh image of a Sidewinder (*Crotalus cerastes*) poised near a fresh kill (Figure 5, right side). In the not-yet-mentioned feeding frenzy category are two references to Fringe-toed Lizards (*Uma inornata*) and a Glossysnake (*Arizona elegans*) who are Dipsodining (Mark Fisher, pers. comm.)

With great enthusiasm, we begin to shift away from California and toward Tucson, Arizona. Jeez—I thought I'd *never* leave. There are a number of *major* differences between Desert Iguana habitat in California and Tucson. The biggest difference is elevation. The bulk of Dipso studies in California are all under 152 meters (~500 feet) in elevation. The places that I see them near Tucson range from 632 meters (~2074 feet) to 800 meters (2,625 feet.) The change in altitude brings on cooler summer temperatures here, which in turn sets up a slightly different climatic situation. The higher elevation in Tucson allows for a greater variety of plant life. In California, the sparse rainfall that they receive occurs primarily in the spring. That basically means that the flowering annuals that Dipsos relish may only bloom once a year. In good years, Tucson receives bimodal rainfall patterns. One occurs in late fall and winter, and the other is from July through September. The extra rain creates an additional blooming period. This would be a good place to show the difference between the overall gestalt of California populations and those in the Tucson vicinity. For comparative purposes, I have lined up an image of the Muth, Fisher and Barrow Coachella Valley study site, and compare it to one of mine from the 'winder Spot (Figure 6). Any reader unfamiliar with populations of Desert Iguanas might be inclined to think that those located in the comparatively lush environment depicted in the image to the right might have a more robust population. But population-wise, the two are not even close. Muth et al. have seen more Dipsos in one day in the Coachella Valley than I have seen in my *best year* near Tucson. For example, Al Muth informed me that he saw 170 in one day in April of 2009, and 171 in April of 2010. (Al Muth, pers. comm.). My best year was 2018, when a focused and extensive effort netted me 137! Having armed the reader with this sort of information, I do believe we are ready to roll into Arizona now.

Dipso numbers near Tucson

I am going to begin this part of the column with some quick

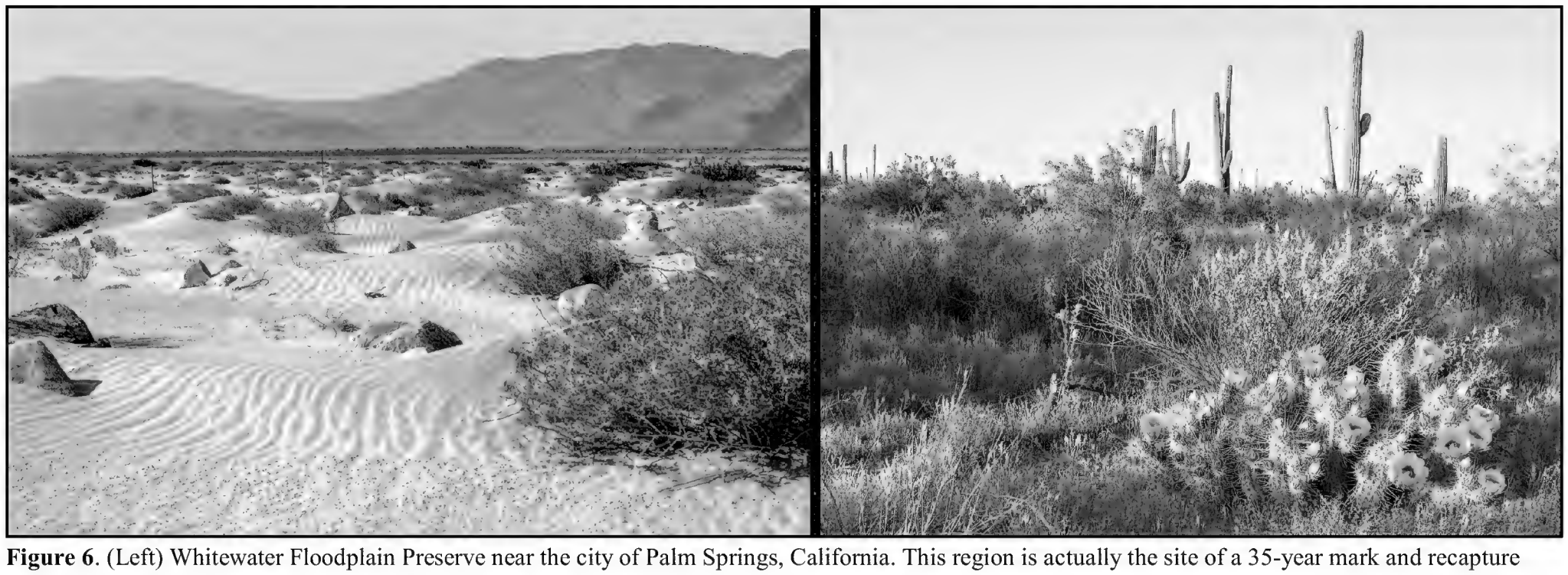


Figure 6. (Left) Whitewater Floodplain Preserve near the city of Palm Springs, California. This region is actually the site of a 35-year mark and recapture study of Fringe-toed Lizards (*Uma inornata*). But as many as 171 Desert Iguanas have been observed in one morning here. Image by Al Muth. (Right) By contrast, the author's beloved 'winder spot in south-central Pinal County, Arizona, also harbors Desert Iguanas. Here, as many as seven can be seen in one day! Image by the author.

statistics. Since I began counting herps in 1989, I have had, to date, 717 total visuals / sightings of Dipsos. It is interesting to note that only 16 of these have been DOR. This would indicate that they are better at avoiding speeding vehicles than most of the local snake species. The fine California folk have had a righteously good time picking on both me *and* my adopted state at the mere mention of this paltry number. I must first say in my own defense that a fairly high percentage of the approximately 3800 field trips I made during this 33-year time span have either been nocturnal, or at mile-high elevations. That fact alone is going to eliminate a lot of Dipsos! On top of that, it was not until 2017 that I slowed my vehicle down enough to even consider that I was seriously *trying* to find one. Nope! On those occasions when I saw any "pre-2017" Dipsos, they were mostly only the large and obvious adults—some of which were viewed at speeds of 60 miles per hour—or faster. From 2017 to now, when I slowed down and made Dipsos the focus of my field efforts, 369 of the 717 sightings occurred. That is over half (51%) of the total sightings accumulated over the span of 33 years—in less than five! While even *those* numbers will no doubt *still* raise a snicker out of my Dispso-mobbed California colleagues, perhaps telling them that I have over 500 individual Gila Monsters—and heaven only knows how many sightings—under my belt, will help them to understand my priorities? And I didn't have to deal with a personal cloacal temperature of 116°F for half of my field time to pull it off!

My two mentors in the "Seeking Dipsos 101" course

The Lord and herpers work in mysterious ways. My education on how to best seek Dipsos started with a woman named Catherine Stevens. Catherine was studying the spatial mitochondrial DNA aspects of Dipsos across their known range. I first met Catherine through a herper named Jon Davis. The mere mention of his name reminds me that if I ever run out of things to say, Jon would make *very* good column material. But I show great restraint here by saying that Jon had just met a woman named Catherine, who claimed to have seen 12 Dipsos on Park Link Drive. It so happens that in 2008, when this claim first reached my ears, I had been cruising that particular road for over 20 years. It was the main drag to and from our Suizo Mountain Study Plot. And I had never seen more than two Dipsos per round trip on that road. I told Jon that I thought that this Catherine was full of shit. I don't know what Jon told her, but it wasn't 15 minutes later, Catherine sent me an email, trying to arrange a Dipso run to Park Link Drive with me. She would only be around for a few more days, and it seemed important to her that we do this Park Link run together. I do believe that she wanted to show me just *who* was full of shit. We agreed to 12 August 2008 as our date to do it, despite the fact that the day was on a Tuesday, and required a vacation day from my end. My wife Dianna and I met her the night before. Dianna deemed Catherine to be happily married, and all was made ready for the next day. Catherine insisted on driving. When I saw that her chariot was a brand spanking new, massive Cadillac Escalante SUV, I was "all in" with the notion of her doing the driving.

But when we got to Park Link Drive, in the lap of luxury as it were, I was shocked to see her set her cruise control to five miles per hour. At first, I became agitated, and did everything in my power to get her to speed up. She steadfastly refused. And then, one by one, we began to visually pick off the Dipsos. We were seeing most of them out of the side window, all were either in the shade of creosote, or arboreal as high up as one meter in them. We called it quits at 1230 hours. To make a long story short, we saw 17 Dipsos in just less than two hours time. The lesson learned here was that one can not possibly drive too slow when seeking lizards of *any* kind. That is a good rule to follow, and as I have learned from the Red Green television show: "Anything worth doing is worth doing slow." Thank you, Catherine—wherever you are!

My second mentor was Marty Feldner. When *he* was in the shotgun seat, it didn't matter how fast one was driving. The lesson began on 18 May 2012 with a trip that we made to Muleshoe Ranch to assist Melissa Amarello and Jeff Smith with their "National Snake Day" project. While I had been counting *all* species of lizards ever since the year 2000, Marty was the first person *ever* to jump right in there and help me to count them. When he began sounding off with lizards that I wasn't seeing, I actually stopped the vehicle and backed up to double check him. This happened about five times, and each time, whatever lizard he had seen was right where he said it would be. The last time I did the backup routine on this day was with a Desert Spiny Lizard he called out. I was in reverse until he told me to stop. He then pointed to a boulder about 50 meters to our right. Sure enough, perched on top of that boulder was that spiny lizard. We had been rolling at about 40 miles per hour when he spotted it. Anybody who really knows Marty will tell you that his skill at doing this sort of thing is downright uncanny. And he *never* loses focus. Nobody does it better. Before meeting Marty, my method for searching for lizards was to visually cover the road and the berms on both sides. I did not look any further to the left or right than that. While I will never be as good at this as Marty (nobody is), I have at least learned to look beyond the berms, and focus on the shadows and boulder tops as well. When I combine Marty's skill with what "Slow Ride Catherine" taught me, I have good results. That is especially true for Dipsos at a place that I call "The Hood."

The Hood

Dianna and I purchased and moved into our current residence in June of 2003. Our home is situated in small community of ground-set double-wide mobile homes. The subdivision carries the rather grandiose name of "Twin Peaks Estates." Our subdivision is nestled against the northeast flank of the Tucson Mountains. As a result, we have a magnificent view of Safford Peak, which towers over a thousand feet above us. The vistas that surround our subdivision are magnificent, and indeed worthy of the word "estate." However, I do not kid myself into thinking that I live a fat-cat life in a lordly estate. My home is a double-wide mobile home, set on a quarter acre of ground. While I don't consider myself above anybody, we are not quite trailer trash. (Although some who *do* consider themselves above others might think that we are.) The place is a sensible fit to our budget, and the location was chosen with more in mind than the view. In 2003, when the Suizo Mountain Project was in full swing, I needed a quick getaway from Tucson—one with a good chance at finding herps all the way there and back. Indeed, my

quickest route out of town takes me over a low saddle in the Northern Tucson Mountains that is aptly named "Rattlesnake Pass." From my driveway to the bottom northwest side of Rattlesnake Pass (up, over the top, and back down) is roughly two miles. I have seen all five species of rattlesnake that can be expected in that two miles. And on 19 July 2003, less than a month after moving here, I saw my first Dipso. That first one was a DOR adult, which I collected and kept in the freezer for a while. My intent was to one day make a big deal out of both it *and* the location. Once I came to my senses, and figured out that I didn't necessarily need a bunch of lizard geeks swarming my turf, I instead fed it to my albino Kingsnake. There—we have a new predator of Dipsos to add to the list. One *very* stupid albino Kingsnake! That *idiot* of a snake constricted that dead Dipso for over an hour before eating it. *Gawd* he was a dumbass!

From that very first dead Dipso in July of 2003 to today, I have continued to rack up Dipsos on the northwest side of Rattlesnake Pass. Until 2017, when I began to slow down and actually seek them, every one of them was an incidental encounter. From 2017 onward, there was dramatic increase in my numbers when I began a "Slow Ride Catherine" approach in a place I call "The Hood." The Hood is a mismatch of elegant homes and completely trashed single-wide trailers, all on various-sized plots of land that are in turn interspersed with creosote-infested plots of open ground. I believe the neighborhood to be zoned as "Whatever." The semi-urban portion of The Hood is almost exactly one mile long east to west, by a half mile wide north to south. As Dipsos can be found just to the east, south and north of it, we can easily (and conveniently) call it one kilometer square in area. We will speak *much* more of The Hood in Part 2 of this column.

On 11 June 2017, at 1105 hours, "Hawkeye Feldner" spied a large adult (my notes say 45 cm [~18 inch] total length Dipso) perched on a meter tall by 3 meters long east-to-west dirt mound. Said dirt mound is situated at the southernmost edge of the yard of a Hood Dweller, flanked by creosote, and just inside an annoying, photo-spoiling wire fence. The dirt mound, which now carries the name of "Marty's Mound," is just on the north side of Lambert Lane, which is the main drag that runs along the southernmost limits of The Hood. We photographed Marty's mound-dwelling Dipso, little realizing that the place would one day be my most highly-photographed location. The astute reader will no doubt recognize that I used the pronoun "he" to describe this Dipso. That is thanks in large part to sex identification help that I have received from Al Muth. According to Dr. Muth, the males are generally larger, have larger heads, and more robust bodies. (Al Muth, pers. comm.) Jeff Howland also suggests that the tails of males are more triangular in cross section than the rounder tails of the females. (Jeff Howland, pers. comm.) The entire army of California Dipsomaniacs have all noosed, handled and processed their subjects, and look at the femoral pores as the determining factor. And they *all* tell me that Dipsos do not attain a total length of 18 inches. The good Dr. Muth sent along a citation from an impeccable source that would indicate a maximum length of 40 cm (15.75 inches). (Smith and Brodie, 1982). Fifteen and three-fourths of an inch? What an icky number! Do we hate it, Precious? ***Yes, WE HATES IT***! But until I start grabbing and processing Dipsos, I am forced to oblige with whatever the experts tell us. I will stick to "large, average, juvenile, young of previous year (YOPY), or young of year (YOY—aka "hatchling")," for any further talk of size with the species.

Whew. This exacting science business can be exasperating. We shall avoid it for the rest of this column. Meanwhile, the sighting of a large adult male on Marty's Mound inspired me to try an experiment. Utilizing the Slow Ride Catherine approach, I would start cruising The Hood, and start photographing every Dipso that would let me. The notion was that I would eventually be able to identify individuals based on photographic evidence. And knowing from experience that most lizards are highly territorial, I would try to find more places like Marty's Mound to zero in upon. The hope was that I would one day be able to identify the same individuals using the same site day after day, and year after year. On 9 and 11 July of 2017, I was able to photograph a large male occupying Marty's Mound. With great excitement, I was able to match images between 11 June 2017 and the two dates mentioned in the previous sentence. What are the odds that I would see three different large adult males basking in nearly the exact spot on Marty's Mound? Apparently, said

Figure 7. The Latin name *Dipsosaurus* translates to "thirsty lizard." Here we see a Desert Iguana getting the very rare chance to get a drink of water. The author found it curious that the lizard chose to drink from the mud at the side of the puddle, rather than the more obvious choice of going for deeper water. Al Muth summed up the situation with more eloquent style: "Dipsos readily drink from any container/surface where the water sparkles (look at the photo), i.e., water with a convex surface such as a drop or convex meniscus." Images by the author, 11 July 2017, "The Hood," Marana, (Pima County), Arizona.

odds are fairly high, for that is *exactly* what happened here!

But something else Dipso-related happened on the 11 July 2017 cruise. It is something that I had never seen before or since. As the wrap-up to Part 1 of this column, we go back to Bezy—the man myth and legend who got me hooked up to the California Dipsomaniac IV. The second-to-last sentence of Dr. Bezy's masterful account in SH contains the following words: "The generic name *Dipsosaurus* is derived from *dipsa* (thirsty) and *sauros* (lizard)." As the figures and captions of the two images below clearly demonstrate, on the morning following the first monsoon of 2017, I was able to find and photograph a *Dipsosaurus* who was (eventually) no longer thirsty (Figure 7). It is interesting to note that in the 35-year study at Whitewater Floodplain Reserve, standing water was *never* observed (Mark Fisher, pers. comm.) Upon closer examination of this image (over four years after it was taken), the author went to the California Dipsomaniacs with two questions. "Was this Dipso a female?" The response was a unanimous "yes." Upon noting her somewhat emaciated condition, question number two was: "Could she have recently oviposited?" (laid her eggs). Once again, the answer was a thunderous and unanimous "yes." This is the perfect segue to what is coming in Part 2 of this column. See the cover photo of this issue for a hint. We have yet to *seriously* discuss reproduction. Until that time . . .

This here is Roger Repp, signing off from Southern Arizona, where the turtles are strong, the snakes are handsome, and the lizards are above average.

Acknowledgments

First, foremost, and last, the author wishes to thank the author. Without *him*, none of this *masterful* creation would have been pulled together. All other obsequious and felonious leg-humping can be found in the text above. On a more serious note—the author is extremely grateful to *all* the names in the text above. Without *them* rallying behind the effort, this column would have been a complete dud.

Author's note:

The California Dipsomaniacs were kind enough to cluster-bomb your hapless author with peer reviewed papers—not a one of which was in comic book form. Over half of the text citations above need to be more thoroughly examined. To save space, and to avoid redundancy and bonehead mistakes, the Literature Cited section will appear at the end of Part 2.

Minutes of the CHS Board Meeting, September 17, 2021

A virtual meeting of the CHS board of directors via Zoom conference video/call was called to order at 7:33 P.M. Board members Rachel Bladow, Rich Crowley, Stephanie Dochterman and John Gutierrez were absent. No nonmembers of the board were present. Minutes of the August 13 board meeting were read and accepted.

Officers' reports

Treasurer: John Archer summarized Rich Crowley's August financial report.

Media secretary: We are in need of a few people to help on the Facebook page, policing and adding family friendly content.

Membership secretary: Mike Dloogatch read the list of those whose memberships have expired, and reported membership holding steady.

Sergeant-at-arms: Tom Mikosz reported that 37 people viewed the August 25 webinar.

Committee reports

Shows: Gail Oomens received only two answers from the email she sent out to past participants in our shows. Neither responder was willing to do the background check that the Notebaert now requires.

Adoptions: Margaret Ann Paauw and Stephanie Dochterman are the new co-chairs for the adoption committee. There is a new phone number for adoption that can be passed on as needed; it will be forwarded to the personal phone of one of the co-chairs. People to help foster are needed.

New Business

Beginning October 27, in-person meetings will be restarting at the Peggy Notebaert Museum. All attendees will need to wear facial masks. We will need someone to pick up raffle items from our storage facility and bring them to the meeting.

Amelia Pollock is looking into 50/50 raffles (legal for non-profits).

Margaret Ann is looking into Rockford Charitable Games as a fund-raising opportunity.

The meeting adjourned at 9:06 P.M.

Respectfully submitted by recording secretary Gail Oomens

Herpetology 2021

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

TURTLES AS WATCHABLE URBAN WILDLIFE

P. V. Lindeman [2020, Chelonian Conservation and Biology 19(2):291-297] remarks that the high valuation of urban green spaces is obvious, given the lost economic opportunities their preservation requires. With more and more of the world's human population moving to urban areas, experiences with urban wildlife are becoming increasingly important for maintenance of people's connection to and concern for the natural world. Turtle watching provides an opportunity to connect urban residents with charismatic species that engender positive aesthetic responses from the public. In Erie, Pennsylvania, the Presque Isle Partnership is a nonprofit organization dedicated to enhancing visitor experiences at Presque Isle State Park. The park is a sandspit peninsula on Lake Erie that has abundant turtle populations in its sheltered bays and interior wetlands, particularly its populations of the common map turtle, *Graptemys geographica*. The common map turtles of Graveyard Pond have long been one of the park's signature wildlife spectacles. A basking aggregation that can exceed 100 turtles in late spring and early fall is enjoyed by visitors to a shoreline picnic area, canoeists, kayakers and guests on the park's pontoon boat tours. In 2012, the Partnership funded construction of a handicapped-accessible turtle observation deck with fixed binocular viewfinders and informative signage. Total material cost for the project was $20,466 (~ $22,922 in 2020 US dollars); labor for construction was donated by local industry. Since its construction, the observation deck has become a popular stop for park visitors. Similar projects would be suitable for many urban areas in the United States and many other countries with watchable turtle populations and would enhance urban residents' encounters with urban turtle populations.

GIANT GARTERSNAKE PREY SELECTION

J. S. M. Ersan et al. [2020, Herpetologica 76(3):290-296] note that introductions of nonnative species can cause great change in the trophic dynamics of native species. Giant gartersnakes, *Thamnophis gigas*, endemic predators in the Central Valley of California, are listed as threatened because of the conversion of their once vast wetland habitat to agriculture. Further contributing to this snake's changing ecology is the introduction of many nonnative prey species, resulting in a diet that is almost completely composed of nonnative species. To determine whether these snakes actively select their prey or simply consume what is abundant, the authors examined prey selection by adult giant gartersnakes in the context of what prey was available to each individual. Giant gartersnakes selected a native anuran over nonnative anuran and fish species despite the nonnatives dominating the available species composition. These results contribute to understanding the mechanisms underlying giant gartersnake diets in the contemporary landscape and can lead to improved management of prey communities for giant gartersnakes and other native predators.

CALLS OF MALFORMED TOADS

A. Cobo-Cuan et al. [2020, Herpetologica 76(3):278-284] note that amphibian malformations occur naturally in wild populations. On Fernando de Noronha, Brazil, normal and dysmorphic Cururu toads (*Rhinella jimi*) are found calling sympatrically in the same ponds. The very high incidence of dysmorphism (~60%) that the authors found in this population confirms that the island remains a hotspot of malformed anurans. Considering that vocal communication is essential in the behavioral ecology in most anurans, they used distortion product otoacoustic emissions to assess the hearing sensitivity of normal and malformed male Cururu toads and to compare the peak auditory sensitivity of each group to their call characteristics. Results show that males with nontympanic malformations maintain a close match between the spectral features of their calls and the frequency tuning of their inner ears, much as the males in the normal population. In the face of rampant, wide-reaching somatic malformations, preserving their acoustic communication channel (as senders and as receivers) could allow dysmorphic toads to maintain their reproductive fitness.

CARRY-OVER EFFECTS IN YELLOW-BELLIED TOADS

U. Sinsch et al. [2020, The Herpetological Journal 30(3):126-134] note that metamorphs of the yellow-bellied toad, *Bombina variegata*, vary widely in size at metamorphosis in the field. They performed a replicated outdoor mesocosm study to simulate the environmental factor combinations in permanent and ephemeral breeding sites and to quantify their effects on tadpole development (duration of the larval period, metamorph size and body condition). Looking for potential carryover effects of the larval environment, they quantified locomotor performance of all metamorph phenotypes originating from the mesocosms immediately after metamorphosis under controlled conditions. In contrast to the prediction of lifehistory theory, tadpoles were unable to adjust developmental rate to water availability, but metamorphs originating from the ephemeral pond treatment were smaller and had a lower body condition than those from the permanent pond treatment. Size-dependent carryover effects included the length of the first jump following tactile stimulation, burst performance (total length of spontaneous jumps) and endurance (total distance covered in 10 forced jumps). A size-independent effect of larval environment was the prolonged locomotor effort to escape (5.7 consecutive jumps following initial stimulus) of metamorphs from the ephemeral pond treatment compared to same-sized ones (3.7 jumps) from the permanent pond treatment. The results demonstrate that carryover effects of larval environment on metamorph phenotype and behavior cause a considerable variation in fitness in the early terrestrial stage of *B. variegata*. Informed conservation management of endangered populations in the northern range should therefore include the provision of small permanent breeding ponds promoting larger and fitter metamorphs.

SHEDDING RATES IN GECKOS

A. Fushida et al. [2020, Herpetologica 76(1):22-26] note that all vertebrates shed the outer layer of their epidermis, usually continuously, but squamate reptiles shed periodically, losing large pieces of this layer at once. While the cellular processes leading to loss of the outer epidermal layer, or shedding, in squamates have been studied in detail, few studies have examined the factors associated with shedding frequency. Shedding is an obligate event, linked to somatic growth and the regeneration of damaged or worn epidermal areas. Another proposed role for periodic shedding in squamates is the removal of ectoparasites and fouling substances stuck on the epidermis. It is unclear whether the removal of ectoparasites and fouling substances is completely passive, only mediated by a fully obligate shedding cycle, or if shedding can be mobilized directly in response to parasite attachment or fouling. To test these hypotheses, the authors first assessed whether shedding reduced the adherence of parasites to the skin of six different species of geckos by counting mites on the outer epidermis before and after shedding events. Next, they assessed whether shedding was triggered by fouling. Using four species of geckos, they applied artificial substances (marker pen [Sharpie™], and wood glue [polyvinyl acetate]) to the outer layer of the epidermis and recorded the time between shedding events (shedding interval) compared to unmanipulated controls. There was a clear decrease in parasite loads after shedding events, confirming that shedding reduces adherence of parasites. The experiments with artificial substances applied to the outer epidermis showed that most gecko species did not change their shedding intervals, regardless of skin-fouling treatment. *Hemidactylus frenatus*, however, increased their shedding rate in response to the application of wood glue. Thus, this study found that parasites, if present, are removed by shedding, and external fouling can trigger shedding at least in one species of gecko.

USE OF ARTIFICIAL SHELTERS BY HELLBENDERS

S. T. Button et al. [2020, Herpetologica 76(4):355-365] note that recently, artificial shelters have been proposed as a novel tool to monitor hellbenders (*Cryptobranchus alleganiensis*) and other cryptobranchid salamanders. Factors that influence artificial shelter use by hellbenders have not been identified, but are important for maximizing the utility of these shelters as monitoring tools. To identify these factors, in 2013–2018 the authors deployed 438 artificial shelters across 10 stream reaches inhabited by hellbenders, within three rivers in the upper Tennessee River Basin. They hypothesized that occupancy and nesting would depend on shelter placement, and would be greatest in reaches with relatively high densities of adult/subadult hellbenders (i.e., >1.5 individuals per 100 m^2). They placed shelters in locations representing a range of instream conditions, but avoided microhabitats that were not suitable for hellbenders. They monitored shelter occupancy by hellbenders every 2–8 wk, and surveyed shelters for nests every 2–5 d during their breeding season. They quantified densities of adult/subadult hellbenders and 10 habitat variables across multiple spatial scales. Hellbenders occupied 46% of artificial shelters, and nested in 17% of artificial shelters that were in place for at least one breeding season. Hellbenders were most likely to occupy and nest in shelters placed in portions of those reaches that were ≥50 cm deep with high densities of adult/subadult individuals. Among the variables considered, population density was the most important factor influencing shelter occupancy by hellbenders. Shelter nesting was most influenced by water depth, but also by population density and time since shelter installation. Both occupancy and nesting in shelters increased for 2–3 yr following shelter deployment. These results provide evidence that artificial shelters constitute efficient tools in some streams for monitoring the occurrence and reproduction of hellbenders.

NEW CHS MEMBERS THIS MONTH

Moshe Ferdman
Aaron Gooley

Advertisements

For sale: **highest quality frozen rodents**. I have been raising rodents for over 30 years and can supply you with the highest quality mice available in the U.S. These are always exceptionally clean and healthy with no urine odor or mixed in bedding. I feed these to my own reptile collection exclusively and so make sure they are the best available. All rodents are produced from my personal breeding colony and are fed exceptional high protein, low fat rodent diets; no dog food is ever used. Additionally, all mice are flash frozen and are separate in the bag, not frozen together. I also have ultra low shipping prices to most areas of the U.S. and can beat others shipping prices considerably. I specialize in the smaller mice sizes and currently have the following four sizes available: Small pink mice (1 day old—1 gm) , $25 /100; Large pink mice (4 to 5 days old—2 to 3 gm), $27.50 /100; Small fuzzy mice (7 to 8 days old—5 to 6 gm), $30/100; Large fuzzy mice / hoppers (10 to 12 days old—8 to 10 gm), $35/100 Contact Kelly Haller at 785-224-7291 or by e-mail at kelhal56@hotmail.com

Line ads in this publication are run free for CHS members—$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to mdloogatch@chicagoherp.org.

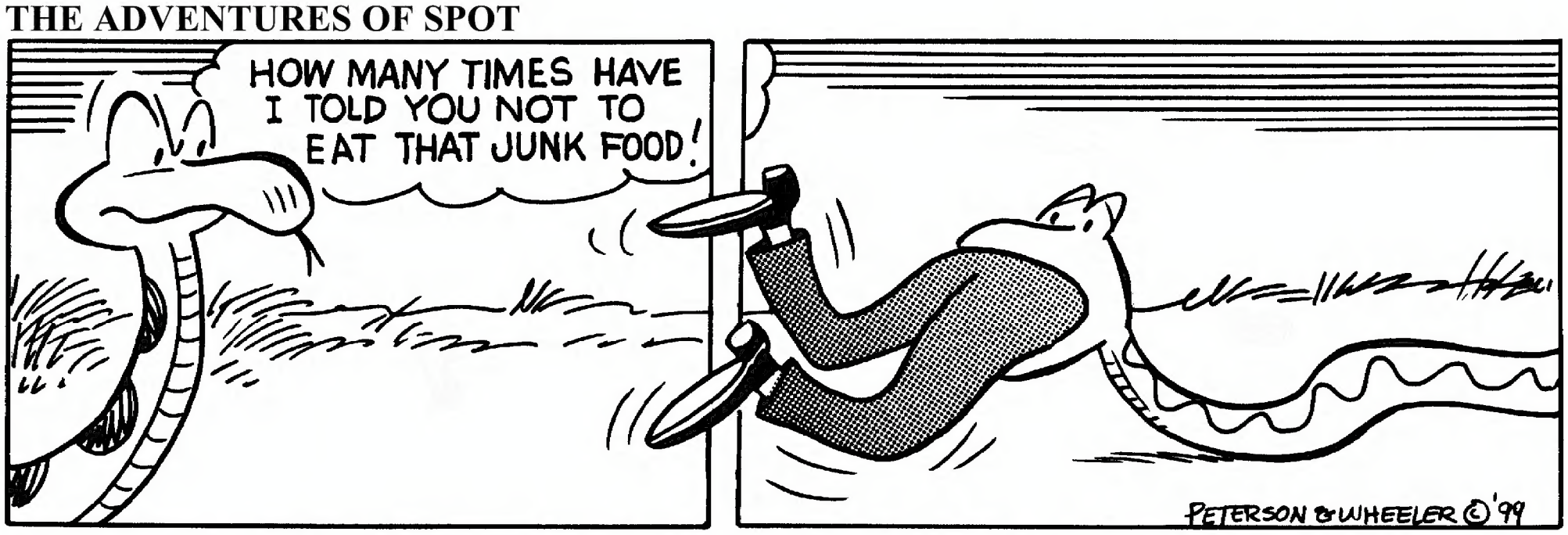
UPCOMING MEETINGS

Please try to join us *in person* for the next meeting of the Chicago Herpetological Society, to be held at 7:30 P.M., Wednesday, October 27, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **Masks will be required for all attendees.** The speaker will be **Lina Kelly**, director of animal care and enrichment at Critchlow Alligator Sanctuary (CAS), a family owned and operated rescue facility located in Athens, Michigan. CAS was created by David and Carmen Critchlow as an outgrowth of their love for reptiles and helping to save many unwanted pets in the area. The facility has rescued animals from 21 states across the country, and is currently home to four crocodilian species and a total of nearly 180 individual animals.

Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? The next board meeting will be held online. If you wish to take part, please email: mdloogatch@chicagoherp.org.

THE ADVENTURES OF SPOT



Periodicals Postage
Paid at Chicago IL

CHICAGO HERPETOLOGICAL SOCIETY

Affiliated with the Chicago Academy of Sciences

2430 North Cannon Drive • Chicago, Illinois 60614